

**ECONOMIC GROWTH  
ANALYSIS SYSTEM:**

**VERSION 4.0  
REFERENCE MANUAL**

**FINAL DRAFT**

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# CONTENTS

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|  | <u>Page</u> |
|--|-------------|
| TABLES AND FIGURES .....   | iv          |
| ACRONYMS AND ABBREVIATIONS .....                                 | v           |
| CHAPTER 1 - INTRODUCTION .....                                   | 1-1         |
| BACKGROUND .....   | 1-1         |
| PURPOSE .....  | 1-1         |
| SCOPE OF EGAS .....  | 1-2         |
| ORGANIZATION OF REPORT .....                                     | 1-2         |
| REFERENCES .....   | 1-7         |
| CHAPTER 2 - EPA GUIDANCE FOR PROJECTING EMISSIONS ACTIVITY ..... | 2-1         |
| STATIONARY POINT SOURCE ACTIVITY .....                           | 2-2         |
| STATIONARY AREA SOURCE ACTIVITY .....                            | 2-3         |
| NONROAD SOURCE ACTIVITY .....                                    | 2-6         |
| ON-ROAD MOBILE SOURCE ACTIVITY .....                             | 2-7         |
| REFERENCES .....   | 2-7         |
| CHAPTER 3 - OVERVIEW OF EGAS 3.0 .....                           | 3-1         |
| TIER 1: THE NATIONAL ECONOMIC TIER .....                         | 3-1         |
| TIER 2: THE REGIONAL ECONOMIC TIER .....                         | 3-1         |
| TIER 3: THE GROWTH FACTOR TIER .....                             | 3-4         |
| REFERENCES .....   | 3-6         |
| CHAPTER 4 - EGAS 4.0 DATA SOURCES, ALGORITHMS, AND UPDATES ..... | 4-1         |
| REMI MODELS .....  | 4-1         |
| PHYSICAL OUTPUT MODULE .....                                     | 4-2         |
| Nonroad Source Categories .....                                  | 4-8         |
| Regression Analyses .....  | 4-8         |
| ENERGY MODULES .....   | 4-9         |
| VMT MODULE .....   | 4-10        |
| CROSSWALK MODULE .....   | 4-15        |
| BEAFAC UTILITY .....   | 4-15        |
| REFERENCES .....   | 4-16        |
| APPENDIX A - EGAS 4.0 MODELING AREAS .....                       | A-1         |
| APPENDIX B - EGAS 4.0 CROSSWALK .....                            | B-1         |

## TABLES AND FIGURES

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| <b><u>Tables</u></b>  | <b><u>Page</u></b> |
|---|--------------------|
| 1-1. Classifications of and Counties Within Designated Ozone Nonattainment Areas . . . . .                        | 1-3                |
| 2-1. EPA Identified Growth Indicators for Projecting Emissions for Stationary Area Source Categories . . . . .    | 2-4                |
| 2-2. EGAS Growth Indicators for Stationary Area Source Categories . . . . .                                       | 2-5                |
| 2-3. EGAS Growth Indicators for Projecting Nonroad Categories Not Included in EPA's Draft Nonroad Model . . . . . | 2-8                |
| 4-1. EGAS Version 3.0 and Version 4.0 BLS Private Non-Farm Sectors . . . . .                                      | 4-3                |
| 4-2. Correspondence Between EGAS Modeling Areas and EIA Census Divisions . . . . .                                | 4-11               |
| 4-3. Results of Regression Analysis of Historical VMT Data . . . . .  | 4-13               |
| A-1. EGAS 4.0 Modeling Areas . . . . .  | A-3                |
| B-1. Physical Output Crosswalk . . . . .  | B-3                |
| B-2. Commercial Fuel Combustion Crosswalk . . . . .   | B-282              |
| B-3. Industrial Fuel Combustion Crosswalk . . . . .   | B-285              |
| B-4. Residential Fuel Combustion Crosswalk . . . . .  | B-297              |
| B-5. Total Area Source Fuel Combustion Crosswalk . . . . .  | B-298              |
| B-6. Electric Generation Fuel Combustion Crosswalk . . . . .  | B-299              |
| B-7. On-Road Mobile Source SCCs Assigned VMT Growth Factors . . . . .   | B-303              |
| B-8. SCCs Assigned No Growth Assumption . . . . .   | B-313              |

### **Figures**

|  |     |
|--|-----|
| 3-1. Flowchart for the Economic Growth Analysis System 3.0 . . . . . | 3-2 |
|--|-----|

## ACRONYMS AND ABBREVIATIONS

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|                 |   |
|-----------------|---|
| ANL             | Argonne National Laboratories                                       |
| BEA             | Bureau of Economic Analysis   |
| BLS             | Bureau of Labor Statistics  |
| CAAA            | Clean Air Act Amendments of 1990                                    |
| CHIEF           | Clearinghouse for Inventories and Emissions Factors                 |
| CO              | Carbon Monoxide   |
| CSEM            | Commercial Sector Energy Model                                      |
| CSEMS           | Commercial Sector Energy Model by State                             |
| DOE             | U.S. Department of Energy   |
| EDFS-14         | Economic and Demographic Forecasting and Simulation 14-Sector model |
| EGAS            | Economic Growth Analysis System                                     |
| EIA             | Energy Information Administration                                   |
| EPA             | U.S. Environmental Protection Agency                                |
| EUMOD           | Electric Utility Model  |
| GSP             | Gross State Product   |
| HOME            | Household Model of Energy   |
| HOMES           | Household Model of Energy by State                                  |
| HPMS            | Highway Performance Monitoring System                               |
| I/M             | Inspection and Maintenance  |
| INRAD           | Industrial Regional Activity and Energy Demand Model                |
| MACT            | Maximum Achievable Control Technology                               |
| MPO             | Metropolitan Planning Organization                                  |
| MSA             | Metropolitan Statistical Area                                       |
| NAAQS           | National Ambient Air Quality Standards                              |
| NAPAP           | National Acid Precipitation Assessment Program                      |
| NEI             | National Emission Inventory   |
| NO <sub>x</sub> | Oxides of Nitrogen  |
| O <sub>3</sub>  | Ozone   |
| PSR             | Power Systems Research  |
| POTW            | Public Owned (Wastewater) Treatment Works                           |
| REMI            | Regional Economic Models, Inc.                                      |
| RFP             | Reasonable Further Progress   |
| RSQE            | Research Seminar in Quantitative Economics                          |
| SCC             | Source Classification Code  |
| SIC             | Standard Industrial Classification                                  |
| SO <sub>2</sub> | Sulfur Dioxide  |
| TSDF            | Treatment, Storage, and Disposal Facilities                         |
| U.S.            | United States   |
| VMT             | Vehicle Miles Traveled  |
| VOC             | Volatile Organic Compound(s)  |

# **CHAPTER 1**

## **INTRODUCTION**

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### **BACKGROUND**

The 1990 Clean Air Act Amendments (CAAA) called for Reasonable Further Progress (RFP) inventories to be submitted to the United States (U.S.) Environmental Protection Agency (EPA) for the purpose of demonstrating strategies by which a 15 percent reduction in emissions would be achieved over the years 1990 to 1996. This requirement applied to moderate, serious, severe, and extreme ozone nonattainment areas. In addition, serious, severe, and extreme nonattainment areas are required to demonstrate at least a 3 percent reduction (averaged over 3-year increments) beginning in 1996 and continuing thereafter until attainment is reached.

A key component of the RFP inventory is the development of credible emissions growth factors. The Economic Growth Analysis System (EGAS) is an EPA economic and activity forecast model that provides credible growth factors for developing projected emission inventories. EGAS Version 1.0 was developed in 1993, Version 2.0 was developed in 1994, and Version 3.0 was developed in fiscal year 1995.

With the advent of the revised National Ambient Air Quality Standards (NAAQS), States will be required to perform modeling of their new nonattainment areas. A key component of this modeling is the continued availability of credible growth factors for use in projecting emission inventories.

### **PURPOSE**

The purpose of this document is to briefly reintroduce EGAS, and to describe the revisions to EGAS 3.0 that were implemented in creating EGAS Version 4.0. The main goals of these revisions were:

- Incorporate an updated set of economic forecast data;
- Incorporate a new set of regression equations for large emission source categories that relate historical emissions activity data to historical economic output data;
- Include more than 2,600 additional Source Classification Codes (SCCs) and review the assignment of all Version 3.0 growth indicators to SCCs and Standard Industrial Classification (SIC) codes;

- Include three new North Carolina modeling areas;
- Incorporate updated energy demand models/forecasts;
- Integrate updated vehicle miles traveled (VMT) forecasts based on the availability of updated historical VMT data;
- Incorporate nonroad emission source category growth indicators from the EPA's draft NONROAD emissions model; and
- Run in a Windows 95/98 environment.

In addition, the EPA updated the BEAFAC utility in EGAS to incorporate U.S. Department of Commerce's Bureau of Economic Analysis' (BEA) final regional forecast series, while also reviewing and updating the assignment of BEA indicators to SCCs and SIC codes.

## **SCOPE OF EGAS**

EGAS 4.0 growth factors can be used to project emission inventories for multiple pollutants. These growth factors, which represent the ratio of a projection year's activity level to the 1996 activity level, are available for more than 2,600 SCCs not included in EGAS 3.0. Many of these new SCCs are related to maximum achievable control technology (MACT)-related source categories. Because the EGAS 3.0 geographic structure was maintained in the updated version, EGAS 4.0 includes separate growth factor modeling for each serious and above and multi-State moderate ozone nonattainment areas as identified in the November 6, 1991, *Federal Register*.<sup>1</sup> A list of these areas, their designations, and the counties included in these areas is presented in Table 1-1. (It should be noted that 3 additional North Carolina modeling areas were incorporated into EGAS 4.0 – Raleigh-Durham, Charlotte, and Greensboro-Winston Salem and that the EGAS 4.0 ozone nonattainment areas may not coincide with current or future ozone nonattainment area boundaries.) In addition, EGAS 4.0 develops growth factors for the attainment portions of the States associated with these nonattainment areas, and for States that did not contain any ozone nonattainment areas. As with EGAS 3.0, Alaska and Hawaii are not included within EGAS 4.0. Appendix A presents a list of the constituent counties included in each of the 75 modeling areas included in the program.

## **ORGANIZATION OF REPORT**

This report includes an overview of EPA guidance on projecting emissions activity (Chapter 2); a review of the EGAS 3.0 modeling system relevant to EGAS 4.0 (Chapter 3); and a discussion of the development of EGAS 4.0, including descriptions of the revisions to the EGAS 3.0 modeling system that were incorporated into the new model (Chapter 4). Additional background discussion about the decisions that went into the initial design of EGAS 3.0 and statutory background related to emission projection requirements can be found in the EGAS 3.0 Reference Manual, which is located on EPA's Clearinghouse for Inventories and Emissions Factors (CHIEF) website at <http://www.epa.gov/ttn/chief/emch/projection/egas/>.<sup>2</sup> Appendix A

displays the EGAS modeling areas included in EGAS 4.0. Appendix B presents the EGAS 4.0 Crosswalk used in assigning surrogate growth indicators to source classification codes (SCCs).



**Table 1-1. Classifications of and Counties Within  
Designated Ozone Nonattainment Areas**

| <b>Designated Area</b>                    | <b>State(s)</b> | <b>Classification</b> | <b>Counties</b>  |
|---|-----------------|-----------------------|--|
| Los Angeles-South Coast<br>Air Basin Area | CA              | Extreme               | Los Angeles County (part)<br>Orange County<br>Riverside County (part)<br>San Bernardino County (part)<br>Monterey Bay Area (Monterey,<br>San Benito, and Santa Cruz<br>Counties)   |
| Chicago-Gary-Lake County                  | IL-IN           | Severe-17             | <b>IL:</b> Cook County<br>Du Page County<br>Grundy County (part)<br>Kane County<br>Kendall County (part)<br>Lake County<br>McHenry County<br>Will County<br><b>IN:</b> Lake County<br>Porter County  |
| Houston-Galveston-<br>Brazoria            | TX              | Severe-17             | Brazoria County<br>Chambers County<br>Fort Bend County<br>Galveston County<br>Harris County<br>Liberty County<br>Montgomery County<br>Waller County  |
| Milwaukee-Racine                          | WI              | Severe-17             | Kenosha County<br>Milwaukee County<br>Ozaukee County<br>Racine County<br>Washington County<br>Waukesha County  |
| New York- New Jersey-<br>Long Island      | NY-NJ-CT        | Severe-17             | <b>CT:</b> Fairfield County (part)<br>Litchfield County (part)<br><b>NJ:</b> Bergen County<br>Essex County<br>Hudson County<br>Hunterdon County<br>Middlesex County<br>Monmouth County<br>Morris County<br>Ocean County<br>Passaic County<br>Somerset County |

**Table 1-1 (continued)**

| <b>Designated Area</b>                          | <b>State(s)</b> | <b>Classification</b> | <b>Counties</b>  |
|---|-----------------|-----------------------|--|
| New York- New Jersey-<br>Long Island, continued | NY-NJ-CT        | Severe-17             | <b>NJ:</b> Sussex County<br>Union County<br><b>NY:</b> Bronx County<br>Kings County<br>Nassau County<br>New York County<br>Orange County<br>Putnam County<br>Queens County<br>Richmond County<br>Rockland County<br>Suffolk County<br>Westchester County   |
| Southeast Desert Modified<br>AQMA               | CA              | Severe-17             | Los Angeles County (part)<br>Riverside County (part)<br>San Bernadino County (part)  |
| Baltimore                                       | MD              | Severe-15             | Anne Arundel County<br>City of Baltimore<br>Baltimore County<br>Carrol County<br>Harford County<br>Howard County   |
| Philadelphia-Wilmington-<br>Trenton             | PA-NJ-DE-<br>MD | Severe-15             | <b>DE:</b> Kent County<br>New Castle County<br><b>MD:</b> Cecil County<br><b>NJ:</b> Burlington County<br>Camden County<br>Cumberland County<br>Gloucester County<br>Mercer County<br>Salem County<br><b>PA:</b> Bucks County<br>Chester County<br>Delaware County<br>Montgomery County<br>Philadelphia County |
| San Diego                                       | CA              | Severe-15             | San Diego County   |
| Ventura Co.                                     | CA              | Severe-15             | Ventura County   |

**Table 1-1 (continued)**

| <b>Designated Area</b>               | <b>State(s)</b> | <b>Classification</b> | <b>Counties</b>  |
|--------------------------------------|-----------------|-----------------------|--|
| Atlanta                              | GA              | Serious               | Cherokee County<br>Clayton County<br>Cobb County<br>Coweta County<br>De Kalb County<br>Douglas County<br>Fayette County<br>Forsyth County<br>Fulton County<br>Gwinnett County<br>Henry County<br>Paulding County<br>Rockdale County                                    |
| Baton Rouge                          | LA              | Serious               | Ascension Parish<br>East Baton Rouge Parish<br>Iberville Parish<br>Livingston Parish<br>Point Coupee Parish<br>West Baton Rouge Parish   |
| Beaumont-Port Arthur                 | TX              | Serious               | Hardin County<br>Jefferson County<br>Orange County   |
| Boston-Lawrence-<br>Worcester (E.MA) | MA-NH           | Serious               | <b>MA:</b> Barnstable County<br>Bristol County<br>Dukes County<br>Essex County<br>Middlesex County<br>Nantucket County<br>Norfolk County<br>Plymouth County<br>Suffolk County<br>Worcester County<br><b>NH:</b> Hillsborough County (part)<br>Rockingham County (part) |
| El Paso                              | TX              | Serious               | El Paso County   |
| Greater Connecticut                  | CT              | Serious               | Fairfield County (part)<br>Hartford County<br>Litchfield County (part)<br>Middlesex County<br>New Haven County<br>New London County<br>Tolland County<br>Windham County  |
| Muskegon                             | MI              | Serious               | Muskegon County  |
| Portsmouth-Dover-<br>Rochester       | NH              | Serious               | Rockingham County (part)<br>Strafford County   |

**Table 1-1 (continued)**

| <b>Designated Area</b>   | <b>State(s)</b> | <b>Classification</b> | <b>Counties</b>   |
|--------------------------|-----------------|-----------------------|---|
| Providence (all RI)      | RI              | Serious               | Bristol County<br>Kent County<br>Newport County<br>Providence County<br>Washington County   |
| Sacramento Metro         | CA              | Serious               | El Dorado County (part)<br>Placer County (part)<br>Sacramento County<br>Solano County (part)<br>Sutter County (part)<br>Yolo County   |
| San Joaquin Valley       | CA              | Serious               | Fresno County<br>Kern County<br>Kings County<br>Madera County<br>Merced County<br>San Joaquin County<br>Stanislaus County<br>Tulare County  |
| Sheboygan                | WI              | Serious               | Sheboygan County  |
| Springfield (Western MA) | MA              | Serious               | Berkshire County<br>Franklin County<br>Hampden County<br>Hampshire County   |
| Washington               | DC-MD-VA        | Serious               | <b>DC:</b> Entire Area<br><b>MD:</b> Calvert County<br>Charles County<br>Frederick County<br>Montgomery County<br>Prince George's County<br><b>VA:</b> City of Alexandria<br>Arlington County<br>City of Fairfax<br>Fairfax County<br>Falls Church<br>Loudoun County<br>Manassas<br>Manassas Park<br>Prince William County<br>Stafford County |
| Cincinnati-Hamilton      | OH-KY           | Moderate              | <b>KY:</b> Boone County<br>Campbell County<br>Kenton County<br><b>OH:</b> Butler County<br>Clermont County<br>Hamilton County<br>Warren County  |

**Table 1-1 (continued)**

| <b>Designated Area</b> | <b>State(s)</b> | <b>Classification</b> | <b>Counties</b> |   |
|------------------------|-----------------|-----------------------|-----------------|---|
| Huntington-Ashland     | WV-KY           | Moderate              | <b>KY:</b>      | Boyd County<br>Greenup County (part)  |
|                        |                 |                       | <b>WV:</b>      | Cabell County<br>Wayne County   |
| Louisville             | KY-IN           | Moderate              | <b>IN:</b>      | Clark County<br>Floyd County  |
|                        |                 |                       | <b>KY:</b>      | Bullit County (part)<br>Jefferson County<br>Oldham County (part)  |
| St. Louis              | MO-IL           | Moderate              | <b>IL:</b>      | Madison County<br>Monroe County<br>St. Clair County   |
|                        |                 |                       | <b>MO:</b>      | Franklin County<br>Jefferson County<br>St. Charles County<br>City of St. Louis<br>St. Louis County (part) |

## REFERENCES

1. 56 *FR* 56694, November 6, 1991.
2. Young, T., TRC Environmental Corporation, "Economic Growth Analysis System: Version 3.0 Reference Manual, Final Report," EPA-600/R-95-132a, prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards and Office of Air Research and Development. Chapel Hill, NC. August 1995.

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## CHAPTER 2

# EPA GUIDANCE FOR PROJECTING EMISSIONS ACTIVITY

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The EPA describes emissions projection guidance in a 1991 document.<sup>1</sup> In a separate document, the Emission Inventory Improvement Program's (EIIP) Projections Committee has addressed the needs of local, State, and regional agencies by providing guidance on options for forecasting future emissions.<sup>2</sup> This chapter presents a summary of this guidance with respect to projecting emissions activity growth for point, area, and mobile sources. This chapter also discusses how the EGAS 4.0 growth factor methodologies and data relate to the EPA and EIIP guidance.

The EPA preferred approach for projecting emissions growth incorporates locality-specific estimates; for point sources, estimates for individual plants are preferred. If emission source growth estimates are not available from individual plants or other local sources, a surrogate growth indicator must be used. There are two steps to the general methodology for applying surrogate growth indicators in estimating emissions activity growth. First, the economic sector or demographic indicator which corresponds to the emissions-producing activity is identified. Second, forecasts of growth in the economic sector/demographic indicator are used to project growth in the activity. For projecting emissions activity, EPA guidance identifies the following economic variables in order of preference: product output; value added; earnings; and employment.<sup>1</sup>

Product output is measured in physical units (e.g., tons of steel produced); value added is a dollar measure of the difference between the value of industry outputs and inputs; earnings denotes wage earnings in an industry; and employment measures the number of workers in an industry. The referenced emission projection guidance suggests that product output is the best indicator of future emission source growth and that its use is "preferable to any of the [other] indicators, if it is available."<sup>1</sup> If product output projections are not available, value added data can be used, and if they are not available, earnings data may also be used. Finally, employment projections may be used, but are not considered to be an effective growth indicator in most cases.

Two sources of surrogate emissions growth information have often been used in projecting emission inventories: the BEA's regional projections series and EGAS. The BEA has published State-level projections data in hard copy and disk format under the title, "Regional and State Projections of Economic Activity and Population to 2045: Volume 1, States."<sup>3</sup> This source provides personal income, earnings, employment, and gross State product (value added) data for select years through the year 2045. The BEA projections series was last published in 1995, and there are no plans for future updates.

The EPA considers growth factors from EGAS to be an approved data set for projecting point, area, and mobile emission source categories. Growth factors from EGAS provide more

timely and more geographically and source category detailed information than factors based on BEA's forecasts. For example, the BEA gross State product (GSP) projections are only available at a 2-digit SIC code level; the economic projections that underlie EGAS are available for 172 Bureau of Labor Statistics sectors, which roughly approximate 3-digit SIC codes. In addition to the additional industry and geographic detail available from EGAS 4.0, for many emission sectors, EGAS growth factors are based on data that are more directly related to the activity associated with air pollutant emissions. For example, EGAS uses energy consumption projections by sector (commercial) and fuel type (distillate oil) to project relevant fuel combustion source categories (commercial sector combustion of distillate oil).

EGAS 4.0 growth factors provide State and local governments with a default set of emissions growth factors for projecting future emissions. However, EGAS growth factor data should be viewed as a starting point for State and local governments in estimating emissions growth. Since annual activity growth will fluctuate rather than occur in smooth, year-by-year increases or decreases, the default factors should be reviewed and modified by State and local governments based on local knowledge of plant expansions, plant closures, new facility construction, or similar factors that would be expected to temporarily deviate from the EGAS growth projections for any one year. In addition, given the scope of EGAS, it was not possible for EPA to incorporate its most preferred methods for developing emissions activity growth estimates for some source categories. For example, EGAS does not employ travel demand models to forecast VMT growth for on-road mobile sources. Therefore, State and local governments should not view EGAS 4.0 as the last word in emissions activity forecasting.

The remainder of this chapter presents EPA guidance specific to point, area, and mobile emission sources and the relationship of EGAS growth factors to this guidance.

## **STATIONARY POINT SOURCE ACTIVITY**

Sources of information for projecting stationary point source emissions activity identified by EPA include the facilities where emissions activities are located and local planning agencies. The permit application process may also yield information on planned construction or expansion of existing capacity. However, EPA emission projection guidance suggests that plant-specific surveys may not always be a reliable source of information because much of the information that is relevant to emission projections (e.g., growth or decline in output, plans for expansion) may be confidential. The EPA suggests that a survey of individual point sources only be performed if the following certain circumstances apply: (1) the industry is a dominant industry in the region; (2) the industry's growth may not be captured in the regional projections; and (3) it is expected that the industry may experience significant growth or decline.<sup>1</sup> Finally, emissions growth at a plant may be projected from information obtained for other point sources in that area and category. This procedure uses a growth trend developed from information from a group of facilities and applies it to a facility for which there is no available information. The EPA notes that when information is not available from plants, permit applications, or local planning agencies, projected economic variables, such as those described above, may be used to estimate emission source growth.

EGAS is a source of product output, energy demand, and socioeconomic data that can be used to project point source activity. EGAS produces default growth factors for commercial and industrial energy consumption, fuel consumption by electric utilities, and physical output by Bureau of Labor Statistics (BLS) sector (generally equivalent to 3-digit SIC codes). These growth factors are then translated, via the EGAS Crosswalk, into default growth factors by SCC or SIC. Emission projection developers may revise the EGAS growth factors based on information that they have on specific emission sources. The ability to override default growth factors may be most important for mobile sources and electric utilities.

EGAS 4.0 uses the following socioeconomic and energy consumption information in developing stationary point source growth factors:

1. Constant dollar output/value added estimates for 172 economic sectors;
2. Physical output (e.g., tons of basic oxygen furnace steel produced) estimates for some major emitting source categories;
3. Estimates of energy consumption by fuel type for the commercial, industrial, and electric utility fuel combustion sectors;
4. Population; and
5. Personal consumption expenditures for gasoline and oil.

The EGAS Crosswalk, which translates economic and energy consumption forecasts into emissions activity growth factors by SCC, is discussed in Chapter 4.

## **STATIONARY AREA SOURCE ACTIVITY**

The EPA guidance on projecting inventories includes growth indicators for area sources. These indicators are listed in Table 2-1, along with potential information sources identified by EPA. Because area sources are not individually projected, information from permits or specific plants can not be used directly. Local studies or surveys, however, may provide information that can be used to develop surrogate growth factors.<sup>1</sup>

EGAS provides default area source growth factors. Area source growth indicators identified in EPA's "Procedures for Preparing Emissions Projections" are listed in Table 2-1.<sup>1</sup> As Table 2-1 indicates, metropolitan planning organizations (MPOs) will probably be the best source of information for some of these indicators. In Table 2-2, these indicators are listed along with related EGAS growth factor outputs. In several cases, (e.g., Pesticide Applications), EGAS provides growth factor data that are more specific to the emissions activity than the surrogate indicator identified in EPA's guidance.

EGAS uses the following information for projecting area source categories:



**Table 2-1. EPA Identified Growth Indicators for Projecting Emissions for Stationary Area Source Categories<sup>1</sup>**

| <b>Source Category</b>  | <b>Growth Indicators</b>   | <b>Information Sources</b>                                 |
|---|--|--|
| Gasoline Marketing  | projected gasoline consumption                                   | MOBILE4.1 fuel consumption model                           |
| Dry Cleaning  | population; retail service employment                            | solvent suppliers; trade associations                      |
| Degreasing (Cold Cleaning)  | industrial employment  | trade associations   |
| Architectural Surface Coating   | population or residential dwelling units                         | local MPO  |
| Automobile Refinishing  | industrial employment  | BEA  |
| Small Industrial Surface Coating  | industrial employment  | BEA  |
| Graphic Arts  | population   | State planning agencies; local MPO                         |
| Asphalt Use - Paving  | consult industry   | consult industry   |
| Asphalt Use - Roofing   | industrial employment; construction employment                   | local industry representatives                             |
| Pesticide Applications  | historical trends in agricultural operations                     | State department of agriculture; local MPO                 |
| Commercial/Consumer Solvent Use   | population   | local MPO; State planning agencies                         |
| Publicly Owned Treatment Works (POTWs)  | site-specific information  | State planning agencies                                    |
| Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)                  | State planning forecasts   | State planning agencies; local MPO                         |
| Municipal Solid Waste Landfills   | State waste disposal plan  | local MPO; State planning agencies                         |
| Residential Fuel Combustion   | residential housing units or population                          | local MPO  |
| Commercial/Institutional Fuel Combustion  | commercial/institutional employment; population                  | local MPO; land use map projections                        |
| Industrial Fuel Combustion  | industrial employment (SIC 10-14, 50-51); or industrial land use | local MPO; land use projections; State planning agencies   |
| Aircraft (Commercial and General)   | site-specific forecasts  | local airport authority and commercial carriers            |
| On-site Incineration  | based on information gathered from local regulatory agencies     | local regulating agencies and MPO; State planning agencies |
| Open Burning  | based on information gathered from local regulatory agencies     | local agencies; State planning agencies; local MPO         |
| Fires: Managed Burning, Agricultural Field Burning, Frost Control (Orchard Heaters) | areas where these activities occur                               | U.S. Forest Service, State agricultural extension office   |
| Forest Wildfires  | historical average   | local, State, and federal forest management officials      |
| Structural Fires  | population   | local MPO; State planning agencies                         |

**Table 2-2. EGAS Growth Indicators for Stationary Area Source Categories**

| <b>Source Category</b>  | <b>Growth Indicators Identified in EPA Guidance<sup>1</sup></b>  | <b>Relevant EGAS Growth Indicator</b>                                   |
|---|--|---|
| Gasoline Marketing  | projected gasoline consumption                                   | projected gasoline consumption*   |
| Dry Cleaning  | population; retail service employment                            | constant dollar output in laundry, cleaning, and shoe repair sector     |
| Degreasing (Cold Cleaning)  | industrial employment  | constant dollar output in specific industry                             |
| Architectural Surface Coating   | population or residential dwelling units                         | projected architectural coatings use*                                   |
| Automobile Refinishing  | industrial employment  | projected automobile refinishing coatings use*                          |
| Small Industrial Surface Coating  | industrial employment  | constant dollar output in specific industry                             |
| Graphic Arts  | population   | constant dollar output in commercial printing and business forms sector |
| Asphalt Use - Paving  | consult industry   | constant dollar output in commercial sector                             |
| Asphalt Use - Roofing   | industrial employment; construction employment                   | constant dollar output in commercial sector                             |
| Pesticide Applications  | historical trends in agricultural operations                     | projected amount of pesticides applied*                                 |
| Commercial/Consumer Solvent Use   | population   | SCC-specific—see Appendix B   |
| Publicly Owned Treatment Works (POTWs)  | site-specific information  | constant dollar output in water and sanitation sector                   |
| Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)                  | State planning forecasts   | SCC-specific—see Appendix B   |
| Municipal Solid Waste Landfills   | State waste disposal plan  | constant dollar output in water and sanitation sector                   |
| Residential Fuel Combustion   | residential housing units or population                          | DOE/EIA fuel-specific residential energy consumption forecasts          |
| Commercial/Institutional Fuel Combustion  | commercial/institutional employment; population                  | DOE/EIA fuel-specific commercial energy consumption forecasts           |
| Industrial Fuel Combustion  | industrial employment (SIC 10-14, 50-51); or industrial land use | DOE/EIA fuel-specific industrial energy consumption forecasts           |
| On-site Incineration  | based on information gathered from local regulatory agencies     | SCC-specific—see Appendix B   |
| Open Burning  | based on information gathered from local regulatory agencies     | population  |
| Fires: Managed Burning, Agricultural Field Burning, Frost Control (Orchard Heaters) | areas where these activities occur                               | SCC-specific—see Appendix B   |
| Forest Wildfires  | historical average   | no growth assumed   |
| Structural Fires  | population   | projected tons burned*  |

\* - based on regression analysis approach (see Chapter 4 for discussion).

1. Constant dollar output/value added estimates for 172 economic sectors;
2. Physical output (e.g., gasoline consumption) estimates for some major emitting source categories;
3. Estimates of energy consumption by type of fuel for the commercial, industrial, residential, electric utility, and total area source fuel combustion sectors;
4. VMT;
5. Population; and
6. Personal consumption expenditures for gasoline and oil.

Each area source category is matched with an appropriate growth factor using the EGAS Crosswalk. These growth factors correspond to the EGAS outputs identified in Table 2-2 and Appendix B. As with the point sources, the projections developer may choose to override an EGAS growth factor and enter his/her preferred value.

## **NONROAD SOURCE ACTIVITY**

The EPA is currently developing the NONROAD model as a means for developing base and projection year emission estimates for most, but not all, nonroad source categories. The NONROAD model estimates emissions by multiplying equipment populations and their associated activity levels (e.g., hours of operation) by the appropriate emission factors. The latest draft version of the NONROAD model at publication of this document was posted on June 12, 2000, and can be found at the following web address: <http://www.epa.gov/otaq/nonrdmdl.htm>.

The NONROAD model uses national equipment population data from Power Systems Research (PSR), a company that tracks the sales and populations of all types of nonroad equipment sold in the U.S. The growth factors in NONROAD represent projected equipment population growth rates. These national factors are differentiated by nonroad application (e.g., construction vs. farm) and fuel type (e.g., gasoline vs. diesel). The NONROAD model growth factors were generally developed by extrapolating from a linear regression of PSR national equipment population estimates for 1989-1996. Exceptions include oil-field equipment (based on BEA projections) and airport ground support equipment (landing and take-off projections).

For nonroad source categories, EGAS generally employs the same growth factor data used in EPA's draft NONROAD model. Because the growth factors in EGAS 4.0 are only one of many inputs to the NONROAD model, EPA recommends that future year nonroad source category emission estimates be computed by running the NONROAD model. Other factors affecting future year emission estimates that are incorporated into the NONROAD model include equipment turnover (scrappage) and emission factors reflecting implementation of future year emission control regulations. Further information on the growth factor and other inputs to EPA's NONROAD model are available from the web-site listed above.

A few nonroad source categories that are not currently included in the NONROAD model are identified in Table 2-3, along with their respective EGAS emissions growth surrogate. Appendix B presents a detailed list of all nonroad SCCs and their EGAS growth indicator assignments. While these indicators appear to be the most appropriate considering the general application of EGAS, other area-specific factors may influence growth in these nonroad categories. For example, water surface area constraints may affect growth in marine vessel use.

## **ON-ROAD MOBILE SOURCE ACTIVITY**

On-road mobile source growth is measured by changes in VMT. Although EPA's preferred VMT forecasting method is the use of locality-specific travel demand models, it is beyond the scope of EGAS to incorporate travel demand models. In keeping with EGAS 3.0 practice, EGAS 4.0 develops on-road mobile source growth factors using a two-phase forecasting approach that is described in Chapter 4. It is important to note that the VMT growth factors in EGAS are not differentiated by road classification or vehicle type. That is, the projected change in *total* VMT is used to develop growth factors for all on-road mobile source categories, regardless of road classification and vehicle type.

Given the limitations of the EGAS VMT projections approach, the EPA recommends that travel demand forecasting models be used by State and local agencies in forecasting VMT growth.

## **REFERENCES**

1. U.S. Environmental Protection Agency. "Procedures for Preparing Emissions Projections," EPA-450/4-91-019 (NTIS PB91-242404). Office of Air Quality Planning and Standards. Research Triangle Park, NC. July 1991.
2. Emission Inventory Improvement Program Projections Committee, "EIIP Document Series, Volume X - Emissions Projections, Final Report," December 1999, available from <http://www.epa.gov/ttn/chief/eiip/techreport/volume10/index.html>.
3. U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, "Regional and State Projections of Economic Activity and Population to 2045: Volume 1, States," Washington, DC. July 1995.

**Table 2-3. EGAS Growth Indicators for Projecting Nonroad  
Categories Not Included in EPA's Draft Nonroad Model**

| <b>Source Category</b>                      | <b>Relevant EGAS Growth Factors</b>   |
|---|---|
| Aircraft-all except Military                | constant dollar output in the Air Transportation sector   |
| Aircraft-Military                           | value added in Federal Military Government sector   |
| Airport Service Equipment                   | constant dollar output in the Air Transportation sector   |
| Commercial Marine Vessels-all except Diesel | constant dollar output in the Water Transportation sector   |
| Commercial Marine Vessels-Diesel            | marine vessel diesel consumption based on regression coefficients and constant dollar output in the Water Transportation sector |
| Military Vessels                            | value added in Federal Military Government sector   |
| Railroad, Diesel                            | railroad diesel consumption based on regression coefficients and output from Railroad Transportation sector                     |

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## **CHAPTER 3**

### **OVERVIEW OF EGAS 3.0**

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As an introduction to Version 4.0, this chapter provides an overview of EGAS 3.0, which was released in 1995. This chapter highlights some of the major similarities and differences between EGAS 3.0 and EGAS 4.0 (Chapter 4 presents additional details on the EGAS 4.0 data sources and forecasting approaches). Figure 3-1 presents a flowchart displaying EGAS 3.0 operations. As the flowchart indicates, EGAS 3.0 was composed of three tiers: a national economic tier, a regional economic tier, and a growth factor tier. Each of these tiers is briefly discussed followed by a background discussion of the EGAS 3.0 BEAFAC utility. This utility provides a set of growth factor data from the BEA that are completely independent from the EGAS operations in Figure 3-1.

#### **TIER 1: THE NATIONAL ECONOMIC TIER**

The EGAS 3.0 national economic tier includes a Regional Economic Models, Inc. (REMI) model of the United States, which is primarily based on projections from the BLS. In addition, the national economic tier provides the option to use macroeconomic forecasts from Wharton Econometric Forecasting Associates (WEFA).

The national tier in EGAS 3.0 functions to allow users to forecast urban and regional economic growth using a common assumption about national economic growth. The national tier also provides users with the ability to use the most current national economic forecasts and to simulate the effects of different levels of national growth on emission-producing activity in nonattainment areas. The national economic tier is discussed in detail in Chapter 4 of the EGAS 3.0 Reference Manual.<sup>1</sup> This tier operates the same in EGAS 4.0 as EGAS 3.0.

#### **TIER 2: THE REGIONAL ECONOMIC TIER**

The EGAS 3.0 regional economic tier includes separate economic models for each of the nonattainment areas and attainment portions of States. The largest geographic area covered by an economic model is a State.

The regional economic models included in EGAS 3.0 were built by REMI. The models simulated interaction between the 14 major sectors of an economy and produced estimates of total output for 210 sectors. The 210-sector outputs were identified by BLS sector. The BLS sectors are closely related to three-digit SIC codes. Outputs from the regional models are used as input data for the growth factor tier of EGAS 3.0 (Tier 3).

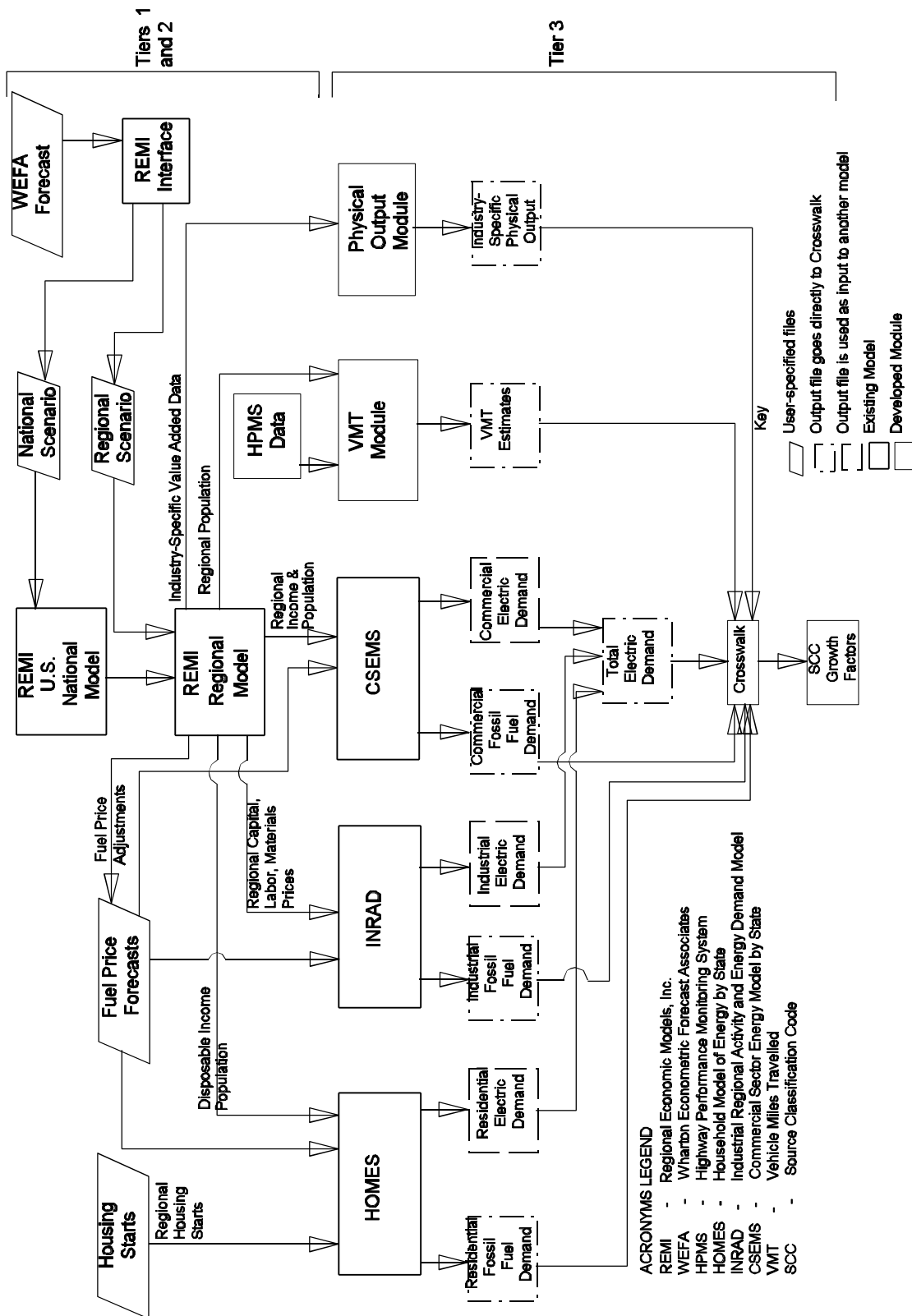


Figure 3-1. Flowchart for the Economic Growth Analysis System 3.0

The EGAS 3.0 REMI models were designed to forecast future activity in an area and to simulate the effects of a policy change in an area. The models allowed the user to simulate the effects of changes in numerous economic policy variables. The list of 101 policy variables included in EGAS 3.0 can be found in Table 1-3 of the EGAS 3.0 Reference Manual.<sup>1</sup>

In EGAS 3.0, the REMI models and outputs contributed to the development of credible growth factors for future-year inventories in the following ways:

1. Forecasts of activity from emission-producing sources are developed for both the attainment and nonattainment portions of States, allowing growth rates to differ between rural and urban portions of a State.
2. Outputs from the models are used to produce area-level estimates of fuel consumption, VMT, and physical output.
3. The effects of a nonattainment area policy on the surrounding areas can be assessed.

REMI outputs and the EGAS 3.0 growth factor tier were linked in the following specific ways:

- REMI models provided income forecasts for estimating residential fuel consumption.
- REMI models provided population and personal income forecasts for estimating commercial energy consumption.
- REMI models provided the forecasts of the relative costs of capital, labor, materials, and output data for estimating industrial fuel consumption.
- REMI models provided industry-specific total output (sales) and value added projections for forecasting physical output.
- REMI models provided population forecasts for use in estimating VMT.

The regional economic tier is discussed in more detail in Chapter 4 of the EGAS 3.0 Reference Manual.<sup>1</sup> The EGAS 4.0 regional economic tier is largely similar to EGAS 3.0 in that the EGAS 4.0 regional economic tier is based on regional economic models developed by REMI. However, the updated models included in EGAS 4.0 have reduced the available number of BLS sectors from 210 to 168, and REMI model outputs are no longer used as inputs to energy models for the purpose of forecasting fuel consumption. In addition, due to resource constraints, it was necessary to remove the EGAS 3.0 policy change simulation capability from EGAS 4.0.



### **TIER 3: THE GROWTH FACTOR TIER**

The third tier is the largest portion of EGAS. Housed within the EGAS 3.0 growth factor tier are the commercial, residential, industrial, and electric utility energy models; a VMT module; a physical output module; and a Crosswalk. As identified at the end of this section, several of these models were substantially revised in EGAS 4.0.

The commercial, residential, and industrial energy models in Version 3.0 were modified from models originally developed by Argonne National Laboratories (ANL) for use in the National Acid Precipitation Assessment Program (NAPAP). The residential energy model, the Household Model of Energy (HOME), was developed for use in the NAPAP model set in the mid-1980s. In 1989-1990, ANL updated the HOME model to include the capability to model residential fuel consumption at the State, rather than Census, level (HOMES). In EGAS 3.0, REMI forecasts of population data for nonattainment areas and attainment portions of States are input with State-level fuel price forecasts to develop estimates of residential fuel consumption growth for seven fuels for each of the nonattainment areas and attainment portions of States.

The commercial energy model, the Commercial Sector Energy Model (CSEM), was also developed for use in the NAPAP model set in the mid-1980s and updated in 1989-1990 to estimate commercial fuel consumption at the State level (CSEMS). Inputs to CSEMS include State-level fuel price forecasts and REMI forecasts of population and personal income at the sub-State level.

The industrial energy model, the Industrial Regional Activity and Energy Demand Model (INRAD), was developed to predict how energy use will be influenced by energy prices and the general level of economic activity. As modified for EGAS 3.0, INRAD estimates coal, oil, gas, and electricity consumption for the following sectors: food, textiles, upstream paper products, downstream paper products, upstream chemicals, downstream chemicals, glass, glass products, and metals. Inputs to INRAD include State-level forecasts of fuel prices and REMI forecasts of the relative costs of capital, labor, and materials at the sub-State level.

The VMT module projects VMT growth factors for the EGAS 3.0 modeling areas. The first-phase EGAS 3.0 VMT projection method (1990-1996) is based on Federal Aid Urbanized Area Highway Performance Monitoring System (HPMS) data for 1985-1990. The methodology uses regression analysis of these data to establish short-term non-attainment area-level trends in VMT growth. For projections beyond 1996, EGAS 3.0 allocates national VMT growth as projected by the EPA MOBILE4.1 Fuel Consumption Model to individual areas based on population growth projected by the REMI model.

The EGAS 3.0 physical output module relies on total output (sales) data generated by the REMI models. Industrial VOC source categories were ranked by their contributions to industrial VOC emissions and equations were developed for the largest VOC categories. These equations relate changes in physical output by BLS sector with changes in total sales and a time trend to capture technological change. These equations provide better estimates of VOC-producing activity than total sales alone because they estimate change in actual material output, which is related to the use of VOC producing materials, such as surface coatings and degreasers. For

industrial VOC categories for which equations were not developed, activity levels are forecast using total sales forecasts from the REMI models.

Electricity generation by electric utilities is forecast in EGAS 3.0 using the Neural Network Electric Utility Model (EUMOD). EUMOD is a behavioral model which uses three embedded neural networks to calculate annual generation activity indices and annual generation resulting from combustion of coal, oil, and natural gas in each of the forty-eight contiguous States. Although EUMOD forecasts State-level generation, it assumes that States are grouped into power pools. It also assumes that generation needed to meet demand in any State may be partially located in other States in the power pool. In contrast to traditional electric utility models, EUMOD uses artificial intelligence to learn to relate the amount of electricity generated from data describing generating capacity, climate, peak loads, fuel prices, and power pool effects. The model operates by reading input records, each of which describes one State for one year. Each record is independent of every other record, allowing EUMOD to run any number of scenarios during a single model run.

The Crosswalk is the final component of the EGAS 3.0 system. The Crosswalk translates growth factors from the energy, VMT, and physical output modules into growth by SCC. The Crosswalk was developed by individually matching each of the approximately 7,000 SCCs in EGAS 3.0 with an appropriate growth factor from the Tier 3 modules. This allows different growth factors to be applied to different emission sources from the same industrial category. For example, forecasts of fuel consumption in upstream chemical manufacturing are developed by INRAD, while forecasts of physical output of upstream chemical products are developed in the physical output module. This methodology accounts for the possibility that future emissions associated with an SIC code will vary by type of emissions process. This is consistent with the SCC system of classification which differentiates according to not only industrial category, but also to processes within that category.

EGAS 3.0 also included an independent utility, BEAFAC, which is included in the Emissions Preprocessor System. This utility interpolates between the data points forecasted by the BEA. There are no economic modeling interactions between this utility and the rest of EGAS. BEA State-level earnings data by 2-digit SIC code are the primary data source used to develop BEAFAC growth factors in EGAS 3.0.

Additional details on EGAS 3.0 are provided in the EGAS 3.0 Reference Manual and User's Guide.<sup>1,2</sup> In EGAS 4.0, the Growth Factor Tier incorporates modules and information that is similar to that included in EGAS 3.0 with the following major exceptions:

1. The commercial, residential, industrial, and electric generation energy models have been replaced with energy forecast data from the U.S. Department of Energy;
2. The VMT module incorporates the availability of new Highway Performance Monitoring System VMT data, updated population forecasts from the REMI models, and a slightly revised approach to developing growth factors based on the second-phase VMT forecasts;

3. The physical output module has been updated to incorporate nonroad growth factors based on growth rates from EPA's draft NONROAD model, and to incorporate new regression equations relating REMI output, population, or gasoline and oil consumption expenditures data with emissions activity data;
4. The Crosswalk module was updated to include new SCCs, and the EGAS 3.0 Crosswalk's SCC-growth indicator matches were reviewed and revised to reflect the revisions made to other EGAS modules (e.g., the use of energy forecasts from the Department of Energy); and
5. The BEAFAC utility was revised to incorporate the latest set of BEA gross State product forecasts and to assign BEA projection categories to the new SCCs included in EGAS 4.0.

Chapter 4 presents additional information on the revisions that were made to the EGAS 3.0 Growth Factor Tier in creating EGAS 4.0.

## REFERENCES

1. Young, T., TRC Environmental Corporation, "Economic Growth Analysis System: Version 3.0 Reference Manual, Final Report," EPA-600/R-95-132a, prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards and Office of Air Research and Development. Chapel Hill, NC. August 1995.
2. Young, T., TRC Environmental Corporation, "Economic Growth Analysis System: User's Guide, Version 3.0." EPA-600/R-95-132b, prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards and Office of Air Research and Development. Chapel Hill, NC. August 1995.

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## **CHAPTER 4**

### **EGAS 4.0 DATA SOURCES, ALGORITHMS, AND UPDATES**

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The purpose of this chapter is to describe the data sources and approaches used to develop EGAS 4.0 emissions activity growth factors, and to identify the specific revisions that were made to version 3.0 of the model. This chapter is organized into the following sections:

- REMI models;
- Physical output module;
- Energy modules;
- VMT module;
- Crosswalk module; and
- BEAFAC utility.

#### **REMI MODELS**

The EPA obtained and incorporated updated REMI economic models into EGAS 4.0.<sup>1</sup> Although these models are similar to the models incorporated in EGAS 3.0, there are a number of substantial differences, which are highlighted below.

The national economic tier of the updated REMI models incorporates a new set of underlying national macroeconomic projections. The updated REMI models are now primarily based on the BLS Employment Outlook: 1996-2006 moderate projections. Between 1996 and 2006, REMI uses a labor-force-trended forecast based on the BLS moderate growth benchmark projections. After 2006, REMI uses the BLS moderate-growth labor force participation rates and the Census Bureau's middle population projections for the United States to forecast the labor force. Once the BLS forecast is extended to 2035, REMI uses the latest short-term national forecast from the University of Michigan's Research Seminar in Quantitative Economics (RSQE) to update the U.S. forecast with current national business cycles.

The geographic definitions included in the EGAS 3.0 REMI models were retained in Version 4.0 except for the addition of three modeling areas in North Carolina. These modeling areas are:

- Raleigh-Durham (Chatham, Durham, Franklin, Johnston, Orange, and Wake counties);
- Charlotte (Cabarrus, Gaston, Iredell, Lincoln, Mecklenburg, Rowan, and Union counties in North Carolina and York county in South Carolina); and

- Greensboro-Winston Salem (Alamance, Davidson, Davie, Forsyth, Guilford, Randolph, Stokes, and Yadkin counties).

Because of the addition of these areas, it was also necessary for EPA to incorporate minor revisions to two additional EGAS 3.0 regions. For EGAS 4.0, the “rest-of-State” modeling area for North Carolina was revised to eliminate the counties included in the three new modeling regions described above and the South Carolina modeling area was reduced by the one county (York) included in the Charlotte modeling region. Appendix A presents the list of counties and associated modeling areas incorporated into EGAS 4.0.

Because the REMI models are developed using BLS data, the list of economic sectors included in these models are the same as the sectors included in the BLS projections. EGAS 3.0 contained REMI models that included 210 BLS private non-farm sectors. The updated set of BLS projections only includes 168 private non-farm sectors. Table 4-1 displays a comparison of the previous and current set of BLS private non-farm sectors. Also noted in this table is the list of previous BLS sectors that were matched to SCCs in the EGAS Version 3.0 Crosswalk. As this column indicates, for some emission sectors, it was necessary for EGAS 4.0 to use forecasts for a broader industry category than was the case in EGAS 3.0.

EGAS 3.0 included policy simulation forecasting capabilities that are no longer supported in EGAS 4.0. In EGAS 3.0, users could decide to input changes to a predetermined number of policy variables. For example, an EGAS 3.0 user could reflect the impact that additional future costs (such as air pollution control costs), would have on future emissions growth. Because of resource limitations, it was not possible for EPA to implement the necessary program revisions to account for all of the changes that were made to policy variable designations between the EGAS 3.0 and EGAS 4.0 REMI models. It should be noted, however, that there were significant limitations to EGAS 3.0's policy simulation capabilities. In particular, EGAS 3.0 users could only input information at a very aggregate level. For example, pollution costs imposed on the automobile manufacturing sector would have to be input as a cost increase in the durable goods manufacturing sector. Durable goods manufacturing includes many diverse sectors with little or no relationship to automobile manufacturing (e.g., pulp and paper manufacturing).

## **PHYSICAL OUTPUT MODULE**

The EPA guidance suggests that, when possible, physical output be used to forecast emission source growth because physical output growth is a better indicator of emissions growth than value added, industrial earnings, or employment.<sup>1</sup>

There are two ways that physical output is measured. The first is the direct measure of actual physical output of an industry (e.g., tons of steel). The second method is indirect and is used when direct measures are not available. This second measure is termed "constant dollar output" and is calculated by converting value of shipments and inventory change into constant dollars. The value of shipments added to an industry's inventory change over the course of a year

**Table 4-1. EGAS Version 3.0 and Version 4.0 BLS Private Non-Farm Sectors**

| <b>Sectors (210) Available for EGAS 3.0</b>     | <b>Used In EGAS 3.0?</b> | <b>Sectors (168) Available for EGAS 4.0</b>         |
|---|--------------------------|---|
| Logging   | Y                        | Logging   |
| Sawmills and Planing Mills                      | Y                        | Sawmills and Planing Mills                          |
| Millwork and Structured Wood Members, nec       | Y                        | Millwork, Plywood, and Structured Wood Members, nec |
| Veneer and Plywood                              | Y                        |   |
| Wood Containers and Misc. Wood Products         | Y                        | Wood Containers and Misc. Wood Products             |
| Mobile Homes                                    |                          | Wood Buildings and Mobile Homes                     |
| Prefabricated Wood Buildings                    |                          |   |
| Household Furniture                             | Y                        | Household Furniture                                 |
| Partitions and Fixtures                         |                          | Partitions and Fixtures                             |
| Office and Miscellaneous Furniture and Fixtures | Y                        | Office and Miscellaneous Furniture and Fixtures     |
| Glass and Glass Products                        | Y                        | Glass and Glass Products                            |
| Cement, Concrete, Gypsum, and Plaster Products  | Y                        | Hydraulic Cement                                    |
|   |                          | Concrete, Gypsum, and Plaster Products              |
| Stone, Clay, and Miscellaneous Mineral Products | Y                        | Stone, Clay, and Miscellaneous Mineral Products     |
| Blast Furnaces and Basic Steel Products         | Y                        | Blast Furnaces and Basic Steel Products             |
| Iron and Steel Foundries                        | Y                        | Iron and Steel Foundries                            |
| Primary Nonferrous Metals                       | Y                        | Primary Nonferrous Smelting and Refining            |
| Miscellaneous Primary and Secondary Metals      | Y                        | All Other Primary Metals                            |
| Nonferrous Rolling and Drawing                  | Y                        | Nonferrous Rolling and Drawing                      |
| Nonferrous Foundries                            | Y                        | Nonferrous Foundries                                |
| Metal Cans and Shipping Containers              | Y                        | Metal Cans and Shipping Containers                  |
| Cutlery, Hand Tools, and Hardware               |                          | Cutlery, Hand Tools, and Hardware                   |
| Plumbing and Non-Electric Heating Equipment     |                          | Plumbing and Non-Electric Heating Equipment         |
| Fabricated Structural Metal Products            | Y                        | Fabricated Structural Metal Products                |
| Screw Machine Products, Bolts, Rivets, etc.     |                          | Screw Machine Products, Bolts, Rivets, etc.         |
| Forgings  | Y                        | Metal Forgings and Stampings                        |
| Automotive Stampings                            |                          |   |
| Stampings, except Automotive                    |                          |   |
| Metal Services, nec                             | Y                        | Metal Coating, Engraving, and Allied Services       |
| Small Arms and Small Arms Ammunition            |                          | Ordnance and Ammunition                             |
| Ammunition and Ordnance, Except Small Arms      |                          |   |
| Miscellaneous Fabricated Metal Products         | Y                        | Miscellaneous Fabricated Metal Products             |
| Engines and Turbines                            |                          | Engines and Turbines                                |
| Farm and Garden Machinery                       |                          | Farm and Garden Machinery and Equipment             |
| Construction Machinery                          |                          | Construction and Related Machinery                  |
| Mining and Oil Field Machinery                  |                          |   |
| Material Handling Machinery and Equipment       |                          |   |
| Metalworking Machinery                          | Y                        | Metalworking Machinery and Equipment                |
| Special Industry Machinery                      | Y                        | Special Industry Machinery                          |
| General Industrial Machinery                    | Y                        | General Industrial Machinery and Equipment          |
| Computer Equipment                              |                          | Computer and Office Equipment                       |
| Office and Accounting Machines                  |                          |   |
| Refrigeration and Service Industry Machinery    | Y                        | Refrigeration and Service Industry Machinery        |
| Industrial Machinery, nec                       | Y                        | Industrial Machinery, nec                           |
| Electric Distribution Equipment                 |                          | Electric Distribution Equipment                     |
| Electrical Industrial Apparatus                 | Y                        | Electrical Industrial Apparatus                     |
| Household Appliances                            | Y                        | Household Appliances                                |
| Electric Lighting and Wiring Equipment          | Y                        | Electric Lighting and Wiring Equipment              |
| Household Audio and Video Equipment             |                          | Household Audio and Video Equipment                 |
| Telephone and Telegraph Apparatus               |                          | Communications Equipment                            |

**Table 4-1. (continued)**

| <b>Sectors (210) Available for EGAS 3.0</b>     | <b>Used In EGAS 3.0?</b> | <b>Sectors (168) Available for EGAS 4.0</b>  |
|---|--------------------------|--|
| Broadcasting and Communications Equipment       |                          |  |
| Semiconductors and Related Devices              | Y                        | Electronic Components and Accessories        |
| Miscellaneous Electronic Components             | Y                        |  |
| Storage Batteries and Engine Electrical Parts   | Y                        | Miscellaneous Electrical Equipment           |
| Electrical Equipment and Supplies, nec          |                          |  |
| Motor Vehicles and Car Bodies                   | Y                        | Motor Vehicles and Equipment                 |
| Motor Vehicle Parts and Accessories             |                          |  |
| Truck and Bus Bodies, Trailers, and Motor Homes |                          |  |
| Aircraft  | Y                        | Aerospace                                    |
| Aircraft and Missile Engines                    |                          |  |
| Aircraft and Missile Parts and Equipment        |                          |  |
| Guided Missiles and Space Vehicles              |                          |  |
| Ship Building and Repairing                     | Y                        | Ship and Boat Building and Repairing         |
| Boat Building and Repairing                     | Y                        |  |
| Railroad Equipment                              | Y                        | Railroad Equipment                           |
| Miscellaneous Transportation Equipment          |                          | Miscellaneous Transportation Equipment       |
| Search and Navigation Equipment                 |                          | Search and Navigation Equipment              |
| Measuring and Controlling Devices; Watches      | Y                        | Measuring and Controlling Devices            |
|   |                          | Watches, Clocks, and Parts                   |
| Ophthalmic Goods                                |                          | Ophthalmic Goods                             |
| Medical Instruments and Supplies                |                          | Medical Equipment, Instruments, and Supplies |
| X-ray and Other Electromedical Apparatus        |                          |  |
| Photographic Equipment and Supplies             | Y                        | Photographic Equipment and Supplies          |
| Jewelry, Silverware, and Plated Wire            |                          | Jewelry, Silverware, and Plated Wire         |
| Toys and Sporting Goods                         |                          | Toys and Sporting Goods                      |
| Manufactured Products, nec                      | Y                        | Manufactured Products, nec                   |
| Meat Products                                   | Y                        | Meat Products                                |
| Dairy Products                                  |                          | Dairy Products                               |
| Preserved Fruits and Vegetables                 |                          | Preserved Fruits and Vegetables              |
| Grain Mill Products, and Fats and Oils          | Y                        | Grain Mill Products, and Fats and Oils       |
| Bakery Products                                 | Y                        | Bakery Products                              |
| Sugar and Confectionery Products                | Y                        | Sugar and Confectionery Products             |
| Alcoholic Products                              | Y                        | Beverages                                    |
| Soft Drinks and Flavorings                      |                          |  |
| Miscellaneous Food and Kindred Products         | Y                        | Miscellaneous Food and Kindred Products      |
| Tobacco Products                                | Y                        | Tobacco Products                             |
| Weaving, Finishing, Yarn, and Thread Mills      | Y                        | Weaving, Finishing, Yarn, and Thread Mills   |
| Knitting Mills                                  | Y                        | Knitting Mills                               |
| Carpets and Rugs                                | Y                        | Carpets and Rugs                             |
| Miscellaneous Textile Goods                     | Y                        | Miscellaneous Textile Goods                  |
| Apparel   | Y                        | Apparel                                      |
| Miscellaneous Fabricated Textile Products       |                          | Miscellaneous Fabricated Textile Products    |
| Pulp, Paper, and Paperboard Mills               | Y                        | Pulp, Paper, and Paperboard Mills            |
| Paperboard Containers and Boxes                 |                          | Paperboard Containers and Boxes              |
| Converted Paper Products Except Containers      | Y                        | Converted Paper Products Except Containers   |
| Newspapers                                      |                          | Newspapers                                   |
| Periodicals                                     |                          | Periodicals                                  |
| Books   | Y                        | Books  |
| Miscellaneous Publishing                        |                          | Miscellaneous Publishing                     |
| Commercial Printing and Business Forms          | Y                        | Commercial Printing and Business Forms       |

**Table 4-1. (continued)**

| <b>Sectors (210) Available for EGAS 3.0</b>   | <b>Used In EGAS 3.0?</b> | <b>Sectors (168) Available for EGAS 4.0</b>   |
|---|--------------------------|---|
| Greeting Card Publishing                      |                          | Greeting Cards                                |
| Blank Books and Book Binding                  |                          | Blankbooks and Bookbinding                    |
| Printing Trade Services                       | Y                        | Service Industries for the Printing Trade     |
| Industrial Chemicals                          | Y                        | Industrial Chemicals                          |
| Plastics Materials and Synthetics             | Y                        | Plastics Materials and Synthetics             |
| Drugs   | Y                        | Drugs   |
| Soap, Cleaners, and Toilet Goods              | Y                        | Soap, Cleaners, and Toilet Goods              |
| Paints and Allied Products                    | Y                        | Paints and Allied Products                    |
| Agricultural Chemicals                        | Y                        | Agricultural Chemicals                        |
| Miscellaneous Chemical Products               | Y                        | Miscellaneous Chemical Products               |
| Petroleum Refining                            | Y                        | Petroleum Refining                            |
| Miscellaneous Petroleum and Coal Products     | Y                        | Miscellaneous Petroleum and Coal Products     |
| Tires and Inner Tubes                         | Y                        | Tires and Inner Tubes                         |
| Rubber Products and Plastic Hose and Footwear | Y                        | Rubber Products and Plastic Hose and Footwear |
| Miscellaneous Plastics Products, nec          | Y                        | Miscellaneous Plastics Products, nec          |
| Footwear, Except Rubber and Plastic           |                          | Footwear, Except Rubber and Plastic           |
| Luggage, Handbags, and Leather Products, nec  | Y                        | Luggage, Handbags, and Leather Products, nec  |
| Metal Mining                                  | Y                        | Metal Mining                                  |
| Coal Mining                                   | Y                        | Coal Mining                                   |
| Crude Petroleum, Natural Gas and Gas Liquids  | Y                        | Crude Petroleum, Natural Gas, and Gas Liquids |
| Oil and Gas Field Services                    | Y                        | Oil and Gas Field Services                    |
| Nonmetallic Minerals, Except Fuels            | Y                        | Nonmetallic Minerals, Except Fuels            |
| New Nonfarm Housing, Single Units             |                          | Construction                                  |
| New Nonfarm Housing, nec                      |                          |   |
| Nonfarm Residential Alterations and Additions |                          |   |
| New Farm Housing, Alterations and Additions   |                          |   |
| New Industrial Buildings                      |                          |   |
| New Office Buildings                          |                          |   |
| New Commercial Buildings, Except Offices      |                          |   |
| New Educational Buildings                     |                          |   |
| New Hospitals and Institutions                |                          |   |
| New Nonfarm Buildings, nec                    |                          |   |
| New Communications Facilities                 |                          |   |
| New Electrical Utility Facilities             |                          |   |
| New Water Supply and Sewer Facilities         |                          |   |
| New Gas Utility and Pipeline Facilities       |                          |   |
| New Roads                                     |                          |   |
| New Local Transit Facilities                  |                          |   |
| New Conservation and Development Facilities   |                          |   |
| New Nonbuilding Facilities, nec               |                          |   |
| Maintenance and Repair Construction           |                          |   |
| Railroad Transportation                       | Y                        | Railroad Transportation                       |
| Trucking and Warehousing                      | Y                        | Trucking and Warehousing                      |
| Local and Interurban Passenger Transit        | Y                        | Local and Interurban Passenger Transit        |
| Air Transportation                            | Y                        | Air Transportation                            |
| Water Transportation                          | Y                        | Water Transportation                          |
| Pipelines, Except Natural Gas                 | Y                        | Pipelines, Except Natural Gas                 |
| Passenger Transportation Arrangement          |                          | Passenger Transportation Arrangement          |
| Miscellaneous Transportation Services         |                          | Miscellaneous Transportation Services         |
| Communications, Except Broadcasting           |                          | Communications                                |



**Table 4-1. (continued)**

| <b>Sectors (210) Available for EGAS 3.0</b>        | <b>Used In EGAS 3.0?</b> | <b>Sectors (168) Available for EGAS 4.0</b>        |
|--|--------------------------|--|
| Radio and Television Broadcasting, Cable TV        |                          |  |
| Electric Utilities, Including Combined Services    |                          | Electric Utilities                                 |
| Gas Utilities, Including Combined Services         |                          | Gas Utilities                                      |
| Water and Sanitation, Including Combined Services  |                          | Water and Sanitation                               |
| Depository Institutions                            |                          | Depository Institutions                            |
| Insurance Carriers                                 |                          | Insurance Carriers                                 |
| Insurance Agents, Brokers, and Services            |                          | Insurance Agents, Brokers, and Services            |
| Nondepository; Holding and Investment Offices      |                          | Nondepository; Holding and Investment Offices      |
| Security and Commodity Brokers                     |                          | Security and Commodity Brokers                     |
| Real Estate  |                          | Real Estate  |
| Owner-Occupied Dwellings                           |                          | Royalties  |
|  |                          | Owner-Occupied Dwellings                           |
| Eating and Drinking Places                         | Y                        | Eating and Drinking Places                         |
| Retail Trade, Excluding Eating and Drinking Places | Y                        | Retail Trade, Excluding Eating and Drinking Places |
| Wholesale Trade                                    | Y                        | Wholesale Trade                                    |
| Hotels and Other Lodging Places                    |                          | Hotels and Other Lodging Places                    |
| Laundry, Cleaning, and Shoe Repair                 | Y                        | Laundry, Cleaning, and Shoe Repair                 |
| Personal Services, nec                             |                          | Personal Services, nec                             |
| Beauty and Barber Shops                            |                          | Beauty and Barber Shops                            |
| Funeral Service and Crematories                    | Y                        | Funeral Service and Crematories                    |
| Electrical Repair Shops                            | Y                        | Electrical Repair Shops                            |
| Watch, Clock, Jewelry, and Furniture Repair        |                          | Watch, Jewelry, and Furniture Repair               |
| Miscellaneous Repair Shops                         | Y                        | Miscellaneous Repair Shops                         |
| Private Households                                 |                          | Private Households                                 |
| Automotive Rentals, Without Drivers                | Y                        | Automotive Rentals, Without Drivers                |
| Automobile Parking, Repair, and Services           | Y                        | Automobile Parking, Repair, and Services           |
| Advertising  |                          | Advertising  |
| Services to Buildings                              |                          | Services to Buildings                              |
| Miscellaneous Equipment Rental and Leasing         |                          | Miscellaneous Equipment Rental and Leasing         |
| Personnel Supply Services                          |                          | Personnel Supply Services                          |
| Computer and Data Processing Services              |                          | Computer and Data Processing Services              |
| Detective, Guard, and Security Services            |                          | Miscellaneous Business Services                    |
| Photocopying, Commercial Art, and Photofinishing   | Y                        |  |
| Business Services, nec                             |                          |  |
| Producers, Orchestras, and Entertainers            |                          | Producers, Orchestras, and Entertainers            |
| Bowling Centers                                    |                          | Bowling Centers                                    |
| Commercial Sports                                  |                          | Commercial Sports                                  |
| Amusement and Recreation Services, nec             | Y                        | Amusement and Recreation Services, nec             |
| Motion Pictures                                    |                          | Motion Pictures                                    |
| Video Tape Rental                                  |                          | Video Tape Rental                                  |
| Offices of Health Practitioners                    |                          | Offices of Health Practitioners                    |
| Nursing and Personal Care Facilities               |                          | Nursing and Personal Care Facilities               |
| Hospitals, Private                                 | Y                        | Hospitals  |
| Health Services, nec                               | Y                        | Health Services, nec                               |
| Legal Services                                     |                          | Legal Services                                     |
| Engineering and Architectural Services             |                          | Engineering and Architectural Services             |
| Research and Testing Services                      |                          | Research and Testing Services                      |
| Management and Public Relations                    |                          | Management and Public Relations                    |
| Accounting, Auditing, and Services, nec            |                          | Accounting, Auditing, and Services, nec            |
| Elementary and Secondary Schools                   |                          | Educational Services                               |

**Table 4-1. (continued)**

| <b>Sectors (210) Available for EGAS 3.0</b>  | <b>Used In EGAS 3.0?</b> | <b>Sectors (168) Available for EGAS 4.0</b>                                |
|--|--------------------------|--|
| Colleges and Universities                    |                          |  |
| Libraries, Vocational and Other Schools      |                          |  |
| Individual and Miscellaneous Social Services |                          | Individual and Miscellaneous Social Services                               |
| Job Training and Related Services            |                          | Job Training and Related Services  |
| Child Day Care Services                      |                          | Child Day Care Services  |
| Residential Care                             |                          | Residential Care   |
| Museums and Noncommercial Organizations, nec |                          | Museums, Botanical, Zoological Gardens and Membership Organizations (part) |
| Business and Professional Associations       |                          | Membership Organizations (part)  |
| Labor, Civic, and Social Organizations       |                          |  |
| Religious Organizations                      |                          |  |
| Agricultural Services                        | Y                        | Agricultural Services  |
| Forestry                                     |                          | Forestry, Fishing, Hunting, and Trapping                                   |
| Fishing, Hunting, and Trapping               |                          |  |

equals the value of goods produced in that year. These dollar output values are then translated to dollar outputs for a base year (e.g., 1992) using price deflators developed for each year (the ratios of the price of the output in the current year divided by the price of the output in the base year). The resulting constant dollar output series provides a surrogate measure of changes in physical output. For most emission sectors, the EGAS 4.0 physical output module computes growth factors from the REMI total constant dollar output forecasts.

There are two major changes to the EGAS 3.0 physical output module that EPA implemented in developing EGAS 4.0. The first of these changes was to replace the use of the REMI-derived growth factors for nonroad emission sectors with growth factors from EPA's draft NONROAD model. The second major change concerned new regression analyses used to estimate actual physical output-based growth factors. These revisions are discussed in the following two sub-sections.

### **Nonroad Source Categories**

To keep EGAS consistent with the emissions activity growth factors used in the NONROAD model, EPA incorporated the draft NONROAD model growth factors in EGAS 4.0. Because the growth factors in the draft NONROAD model represent national forecasts, these growth factors do not differ by modeling area. It is important to note that EPA's final NONROAD model may incorporate State-level growth factors for nonroad emission sectors. Before using the EGAS 4.0 growth factors for nonroad emission sectors, interested parties should closely review these values for reasonableness given local conditions. It is also important to note that EPA recommends that local areas directly employ the NONROAD model to develop projection year inventories for the nonroad source categories included in the model.

### **Regression Analyses**

The second major change concerned the estimation of new regression equations relating REMI output data with production or other data that is specifically related to source category emissions activity. A number of concerns were identified from a review of the EGAS 3.0 source categories with regression adjustments applied. In some instances, regression equation coefficients were applied to sectors with unrelated emission activities. For example, the regression coefficients for the plastic products sector were applied to a solvents category (*Miscellaneous Non-Industrial, Consumer, All Products/Process Total All Solvents*) and the same coefficients were applied to source categories where emissions are linked to (1) the amount of natural gas burned and (2) the amount of oil burned.

For EGAS 4.0, EPA revisited the selection of source categories for the regression analysis because (1) there were concerns with improper regression coefficient assignments as indicated above; (2) the previous set of regression categories solely emphasized VOC-emitting sectors; and (3) the categories considered for regression analysis were identified based on emission estimates from a 1985 emissions inventory. For the EGAS 4.0 update, regression analysis categories were identified based on total criteria pollutant annual emissions from the 1996 National Emission Inventory (NEI). [For this effort, total criteria pollutant emissions included emissions from VOCs, oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and particulate

matter of 10 microns or less (PM<sub>10</sub>).] EPA identified the list of regression analysis emission sectors based on the emission activities representing the highest 1996 total criteria pollutant emissions. The first step in identifying these activities was to sum the 1996 NEI emissions by SCC for SCCs that are assigned REMI indicator growth factors in the EGAS 4.0 Crosswalk. These SCCs were then organized into common emission activities. The term “emission activity” refers to emission sectors that employ the same activity indicator to estimate emissions. Emissions activities include the number of acres of agricultural fields burned, the number of barrels of crude oil refined, and the number of tons of steel produced. Next, EPA computed the emission activity-level emissions from the SCC-level emissions in the NEI. Finally, the emission activities were sorted by total emissions to identify the emission activities for regression analyses.

The EPA generally conducted the regression analyses using two major data sets. The first, representing historical constant dollar output data, was obtained from REMI’s Economic and Demographic Forecasting and Simulation 14-Sector (EDFS-14) Single Region U.S. Model, which contains national output data for 1969-1996 for the same BLS sectors as its regional models.<sup>1</sup> The second, representing national emissions activity data for 1970-1992, were from an emissions activity data base compiled for use in developing early versions of the NEI inventory. Due to SIC code inconsistencies that occurred between 1971 and 1972, EPA decided to employ only the post-1971 REMI data in the regression analyses.

For each of the 25 highest emission activities identified from the NEI, EPA first determined whether historical emission activity data were available from the early NEI data base. If so, then the EPA generally regressed these data against REMI constant dollar output data for BLS sectors identified as potential surrogate indicators for that emissions activity. If emissions activity data were not available from the NEI inventory data base, then readily available alternative sources of information were investigated. These regression analyses employed the emissions activity data as the dependent variable. In addition to BLS sector constant dollar output, population and gasoline and oil consumption expenditures were included as independent variables in the regression analyses. Because long-term historical data were not available for some emission activities, and the results of the regression analyses were not statistically significant for three emission activities (Aluminum Production-Prebaked, Carbon Black Production-Oil Furnace Process, and Beef Cattle Feedlots), regression coefficients are included in the EGAS 4.0 physical output module for a subset of the 25 highest emission activities. The emission activities for which regression coefficients are incorporated into EGAS 4.0, account for approximately 36 percent of the criteria pollutant emissions covered by the physical output module. Appendix B identifies the SCCs that have regression coefficients applied in EGAS 4.0.

## **ENERGY MODULES**

Argonne National Laboratories (ANL) developed three of the four energy models used in earlier versions of EGAS (CSEMS, HOMES, and INRAD). These energy models were derived from models that had previously been developed by the U.S. Department of Energy’s Energy Information Administration (EIA). In discussing potential updates to the EGAS 3.0 versions of these models, ANL raised concerns with the validity of the EGAS 3.0 energy model algorithms because key model parameters were specified using pre-1990 data. Given the changes in energy markets that have occurred since this time (e.g., reductions in real energy prices, increases in

energy efficiency) and the refinements to energy modeling that have occurred, ANL staff recommended that the EGAS energy models should be replaced with more recently developed models and data.

Based on concerns with use of the current EGAS energy models, a review was conducted of energy models for potential use in this effort. A number of options were identified from this review, including incorporation of alternative energy models such as EIA's latest energy models. Because of resource constraints, EPA was unable to incorporate new energy models into EGAS 4.0. Instead, EPA directly incorporated EIA energy consumption forecasts from "Annual Energy Outlook 1999" into EGAS 4.0.<sup>2</sup> The EIA data provides forecasts for additional fuel types not included in EGAS 3.0. Although the EIA projections are based on more up-to-date economic forecasts, energy efficiency requirements and technology information, and provide additional fuel-specific projections, they do not provide the level of geographic detail provided by the EGAS 3.0 energy models. For most energy sectors, the EIA's projections are only available for Census Divisions (set of States). Table 4-2 presents the list of EGAS modeling regions matched to Census Divisions. For specific industry-level fuel projections (e.g., distillate fuel use by the chemical manufacturing industry) and some minor electric utility fuel types (e.g., geothermal), EIA's projections are only available at the National level.

Although the EGAS 3.0 electric utility fuel combustion module (EUMOD) was not developed by ANL, for consistency with the other energy modules, EPA decided to also use the EIA's "Annual Energy Outlook 1999" projections data to develop EGAS 4.0 growth factors for electric utility emission sectors.

Tables B-2 through B-6 identify the sector, fuel type, and geography level of the EIA data linked to SCCs in the EGAS 4.0 Crosswalk.

## **VMT MODULE**

The VMT module in EGAS was updated based on the availability of new HPMS VMT data and updated population forecasts from the REMI models. The first-phase EGAS VMT projections approach projects near-term VMT (1997-2002) based on a time-series linear regression analysis of historical EGAS modeling region VMT data. The equations employed in this first-phase approach are as follows:

$$VMT_{i,j} = Constant \% (Trend \times Year) \quad (4-1)$$

**Table 4-2. Correspondence Between EGAS Modeling Areas and EIA Census Divisions**

| <b>EGAS 4.0<br/>Modeling<br/>Regions</b>                              | <b>EIA Census<br/>Division No.</b> | <b>Census Division<br/>Acronym</b> | <b>EIA Census Division<br/>Name</b> | <b>States Included</b>  |
|---|------------------------------------|------------------------------------|-------------------------------------|---|
| NE1, NE2, NE3, NE4,<br>NE5, NE6, NE7, NE8                             | 1                                  | NE                                 | New England                         | Connecticut, Maine, Massachusetts, New Hampshire,<br>Rhode Island, Vermont  |
| M1, M3, M6, M7, M8  | 2                                  | MA                                 | Middle Atlantic                     | New Jersey, New York, Pennsylvania  |
| G1, G2, G3, G4, G5,<br>G7, G8, G9, G10, G11                           | 3                                  | ENC                                | East North Central                  | Illinois, Indiana, Michigan, Ohio, Wisconsin  |
| G6, G12, PL1, PL2,<br>PL3, PL4, R4, R5                                | 4                                  | WNC                                | West North Central                  | Iowa, Kansas, Minnesota, Missouri, Nebraska, North<br>Dakota, South Dakota  |
| M2, M4, M5, M9, M10,<br>M11, M12, S1, S4, S6,<br>S7, S8, S9, S12, S13 | 5                                  | SA                                 | South Atlantic                      | Delaware, District of Columbia, Florida, Georgia,<br>Maryland, North Carolina, South Carolina, Virginia,<br>West Virginia |
| S2, S3, S5, S10, S11  | 6                                  | ESC                                | East South Central                  | Alabama, Kentucky, Mississippi, Tennessee   |
| W1, W2, W3, W4, W5,<br>W6, W8, W9                                     | 7                                  | WSC                                | West South Central                  | Arkansas, Louisiana, Oklahoma, Texas  |
| R1, R2, R3, R6, R7,<br>W7, FW7, FW8                                   | 8                                  | MTN                                | Mountain                            | Arizona, Colorado, Idaho, Montana, Nevada, New<br>Mexico, Utah, Wyoming   |
| FW1, FW2, FW3,<br>FW4, FW5, FW6, R8,<br>R9                            | 9                                  | PAC                                | Pacific                             | Alaska, California, Hawaii, Oregon, Washington  |

and

$$Growth_{i,j} = \frac{VMT_{i,j} - VMT_{i,1990}}{VMT_{i,1990}} \quad (4-2)$$

where:

|          |   |                           |
|----------|---|---------------------------|
| i        | = | EGAS area                 |
| j        | = | year (1997-2002)          |
| Constant | = | regression constant       |
| Trend    | = | regression xG coefficient |

For this effort, EPA employed county-level HPMS VMT data for 1984-1997 used in developing EPA's NEI inventory. EPA aggregated these data by EGAS modeling area and then performed time-series regression analyses on each area's data. The regression coefficients from these analyses were then used in forecasting near-term VMT for each EGAS modeling region. Table 4-3 presents the regression coefficients, r-squareds, and t-statistics for each EGAS modeling region, including the three new modeling regions in North Carolina.

For the second-phase VMT forecasting approach, which is used to develop 2003-2020 growth factors, EPA employed a slightly revised method from the one used in EGAS 3.0. As under EGAS 3.0, Version 4.0 adjusts National VMT projections from EPA's MOBILE4.1 Highway Fuel Consumption Model based on the projected relative population growth rate in each EGAS modeling region to the National population growth rate. Equation 4-3 displays the equation used in developing EGAS modeling area VMT estimates. In developing the VMT estimates from this method, EPA used REMI's updated population projections.

$$VMT_{i,j} = (VMT_{US,j} / VMT_{US,1996}) \times (POP_{i,j} / POP_{i,1996}) \times (POP_{US,j} / POP_{US,1996}) \quad (4-3)$$

where: i = EGAS area  
j = year (2002 - 2020)

Unlike EGAS 3.0, however, the second-phase approach computes VMT estimates beginning with the final year of the first-phase approach (in this case, 2002). The reason for this change is that EGAS 4.0 does not directly use the VMT growth estimates from the second approach identified in equation 4-3, but rather uses these estimates as an intermediate step. The purpose of this Version 4.0 revision is to eliminate the data disconnect that occurs under EGAS 3.0 between the final year of the first-phase approach and the first year of the second-phase approach. Under EGAS 4.0, the second-phase 2002 VMT estimate is used to compute VMT ratios that are applied to the first-phase VMT estimate for 2002. Therefore, post-2003 VMT growth estimates are developed in EGAS 4.0 by applying the VMT ratios from the second-phase VMT forecasts to the first-phase 2002 VMT growth factors.

**Table 4-3. Results of Regression Analysis of Historical VMT Data**

| <b>EGAS Modeling Area</b>                          | <b>Constant</b> | <b>Trend</b> | <b>r<sup>2</sup></b> | <b>T-stat</b> |
|--|-----------------|--------------|----------------------|---------------|
| Boston Nonattainment Area                          | 36376.51        | 925.3696     | 0.955914             | 16.13053      |
| Greater Connecticut Nonattainment Area             | 15764.73        | 359.457      | 0.900098             | 10.39798      |
| Portsmouth Nonattainment Area                      | 2388.654        | 108.1654     | 0.945344             | 14.40674      |
| Providence Nonattainment Area                      | 5655.485        | 151.7226     | 0.689888             | 5.166791      |
| Springfield Nonattainment Area                     | 5358.117        | 64.41044     | 0.456351             | 3.173808      |
| Rest of New Hampshire                              | 3268.74         | 54.00592     | 0.333822             | 2.452181      |
| State of Maine                                     | 9540.258        | 297.7679     | 0.874372             | 9.138953      |
| State of Vermont                                   | 4660.516        | 151.8094     | 0.913523             | 11.25901      |
| New York-New Jersey-Long Island Nonattainment Area | 87655.82        | 2089.25      | 0.946718             | 14.60188      |
| Baltimore Nonattainment Area                       | 14874.49        | 567.9665     | 0.992542             | 39.96247      |
| Philadelphia-Wilmington-Trenton Nonattainment Area | 34861.7         | 1056.282     | 0.987523             | 30.81892      |
| Washington, DC Nonattainment Area                  | 23358.06        | 1098.102     | 0.979251             | 23.79811      |
| Huntington-Ashland Nonattainment Area              | 1542.69         | 67.57148     | 0.908539             | 10.91801      |
| Rest of New York                                   | 46763.51        | 968.2637     | 0.817039             | 7.320355      |
| Rest of New Jersey                                 | 3318.913        | 47.64508     | 0.859238             | 8.558622      |
| Rest of Pennsylvania                               | 59847.27        | 1222.765     | 0.987266             | 30.50175      |
| Rest of Delaware                                   | 1318.623        | 25.61776     | 0.679418             | 5.043005      |
| Rest of Virginia                                   | 38637.79        | 1401.291     | 0.958633             | 16.67584      |
| Rest of West Virginia                              | 11533.45        | 412.5937     | 0.974344             | 21.34781      |
| Rest of Maryland                                   | 13832.64        | 390.4503     | 0.926331             | 12.28376      |
| Atlanta Nonattainment Area                         | 18936.12        | 1891.475     | 0.959473             | 16.85525      |
| Louisville Nonattainment Area                      | 6104.398        | 448.8466     | 0.924078             | 12.08539      |
| Rest of Kentucky                                   | 19582.33        | 712.039      | 0.93141              | 12.76527      |
| Rest of Georgia                                    | 32145.04        | 1282.904     | 0.869314             | 8.934373      |
| State of Tennessee                                 | 35909.69        | 1817.978     | 0.990661             | 35.67874      |
| Rest of North Carolina                             | 28031.06        | 906.6102     | 0.953225             | 15.63797      |
| Raleigh-Durham                                     | 4825.333        | 582.9222     | 0.97007              | 19.72154      |
| Charlotte  | 7725.934        | 614.2007     | 0.962215             | 17.48115      |
| Greensboro-Winston Salem                           | 7767.588        | 510.1437     | 0.972097             | 20.44648      |
| State of Mississippi                               | 17764.78        | 1045.165     | 0.991913             | 38.36563      |
| State of Alabama                                   | 32702.39        | 1577.202     | 0.988389             | 31.96136      |
| Rest of South Carolina                             | 25497.72        | 1077.343     | 0.982776             | 26.1667       |
| State of Florida                                   | 85083.25        | 3877.511     | 0.968085             | 19.07861      |
| Chicago-Gary-Lake County Nonattainment Area        | 41345.04        | 1845.948     | 0.978097             | 23.14874      |
| Milwaukee-Racine Nonattainment Area                | 11852.22        | 448.531      | 0.97723              | 22.69371      |
| Muskegon Nonattainment Area                        | 1082.698        | 29.09394     | 0.877498             | 9.271333      |
| Sheboygan Nonattainment Area                       | 675.7321        | 27.89574     | 0.987488             | 30.77507      |
| Cincinnati-Hamilton Nonattainment Area             | 10806.1         | 549.7466     | 0.966606             | 18.63736      |
| St. Louis Nonattainment Area                       | 16246.12        | 926.3261     | 0.984215             | 27.35322      |
| Rest of Illinois                                   | 28478.34        | 430.5244     | 0.683341             | 5.088782      |
| Rest of Indiana (less Clark and Floyd Counties)    | 34752.56        | 1930.535     | 0.940789             | 13.80813      |
| Rest of Wisconsin                                  | 23311.28        | 933.4941     | 0.979873             | 24.17052      |
| Rest of Ohio                                       | 64161.66        | 2120.919     | 0.978315             | 23.26726      |
| Rest of Michigan                                   | 66707.89        | 1868.176     | 0.932793             | 12.90554      |
| State of Minnesota                                 | 31867.55        | 1100.137     | 0.993956             | 44.42197      |



**Table 4-3. (continued)**

| <b>EGAS Modeling Area</b>   | <b>Constant</b> | <b>Trend</b> | <b>r<sup>2</sup></b> | <b>T-stat</b> |
|---|-----------------|--------------|----------------------|---------------|
| Houston-Galveston-Brazoria Nonattainment Area                                     | 29326.63        | 941.18       | 0.953302             | 15.65145      |
| Baton Rouge Nonattainment Area  | 4511.48         | 149.1469     | 0.798903             | 6.904533      |
| Beaumont-Port Arthur Nonattainment Area*  | 2794.542        | 77.0417      | 0.860861             | 4.308267      |
| El Paso Nonattainment Area  | 2869.492        | 157.4633     | 0.960728             | 17.13371      |
| Rest of Texas   | 102177.4        | 2699.831     | 0.936814             | 13.33845      |
| Rest of Louisiana   | 26832.97        | 439.8113     | 0.611293             | 4.344148      |
| State of New Mexico   | 12303.81        | 750.9655     | 0.976315             | 22.24068      |
| State of Oklahoma   | 29567.93        | 745.4912     | 0.922886             | 11.98388      |
| State of Arkansas   | 15797.09        | 936.7259     | 0.988367             | 31.92997      |
| State of Missouri (less Franklin, Jefferson, St. Charles, and St. Louis Counties) | 28568.89        | 1262.783     | 0.986888             | 30.05359      |
| State of Kansas   | 18778.29        | 605.0877     | 0.992013             | 38.60537      |
| State of Nebraska   | 11845.61        | 359.2408     | 0.988198             | 31.69776      |
| State of Iowa   | 19569.6         | 582.0393     | 0.975415             | 21.81984      |
| State of Colorado   | 24199.37        | 900.8189     | 0.887782             | 9.743436      |
| State of Utah   | 10861.2         | 699.9558     | 0.983112             | 26.43024      |
| State of Wyoming  | 4955.18         | 182.0186     | 0.953056             | 15.60851      |
| State of North Dakota   | 5357.494        | 102.4037     | 0.958891             | 16.73051      |
| State of South Dakota   | 6095.968        | 138.762      | 0.940005             | 13.71187      |
| State of Montana  | 7384.171        | 175.618      | 0.961266             | 17.25695      |
| State of Idaho  | 6897.113        | 482.5422     | 0.957394             | 16.42097      |
| State of Oregon   | 21204.15        | 807.6134     | 0.966715             | 18.66864      |
| State of Washington   | 34932.68        | 1352.458     | 0.918113             | 11.59926      |
| Los Angeles-South Coast Air Basin Nonattainment Area                              | 92116.88        | 3488.421     | 0.94661              | 14.58627      |
| San Diego Nonattainment Area  | 17456.01        | 589.5133     | 0.91114              | 11.09251      |
| Ventura County Nonattainment Area   | 4406.291        | 130.4484     | 0.927095             | 12.35303      |
| Sacramento Metro Nonattainment Area   | 13511.21        | 490.6907     | 0.949794             | 15.06708      |
| San Joaquin Valley Nonattainment Area   | 21125.37        | 427.4021     | 0.593746             | 4.187857      |
| Rest of California  | 59407.98        | 1184.235     | 0.833735             | 7.757189      |
| State of Nevada   | 6750.751        | 592.2892     | 0.976071             | 22.12424      |
| State of Arizona  | 23251.69        | 1618.025     | 0.871325             | 9.014353      |

\* Based on 1993-1997 data because the regression analysis did not yield a statistically significant time-trend over the 1984-1997 period and because a consistent trend in the series only occurs over this period.

## **CROSSWALK MODULE**

A number of significant changes were made for the EGAS 4.0 Crosswalk module. First, a new comprehensive list of SCCs was used to identify SCCs that had not been included in EGAS 3.0. Based on this list, approximately 2,600 new SCCs were incorporated into the Version 4.0 Crosswalk. These SCCs are either maximum achievable control technology (MACT) source categories (e.g., SCC 62540001–MACT Source Categories, Food and Agricultural Processes, Cellulose Food Casing Manufacture, Cellulose Food Casing), SCCs that are more detailed than the general SCCs that are currently included in EGAS Version 3.0 (e.g., SCC 2801500111–Miscellaneous Area Sources, Agriculture Production, Crops, Agricultural Field Burning, Field Crop is Alfalfa: Headfire Burning); or SCCs that represent completely new source categories (e.g., SCC 31401503–Industrial Processes, Transportation Equipment, Boat Manufacturing, Resin Storage). For this effort, the Crosswalk was updated so that these new SCCs are matched to growth indicators developed by one of the other EGAS modules.

In addition, the EGAS 3.0 Crosswalk's SCC-growth indicator matches were reviewed and revised to incorporate the reduction in sector detail available from the new REMI models and revisions to other EGAS modules (e.g., the use of EIA energy demand forecasts). These efforts resulted in a substantial reduction in the number of SCCs for which EGAS employs a no growth assumption. In EGAS 3.0, more than 350 of the approximately 7,300 SCCs were assigned a no growth assumption. Many of these were assigned this assumption not because emissions growth was unlikely, but because no specific growth factor for that emissions sector was available from EGAS 3.0. For EGAS 4.0, only SCCs for which no emissions growth seems valid (e.g., SCC 2701200000–Natural Sources, Biogenic, Vegetation) employ this assumption. Appendix B presents the revised Crosswalk developed for EGAS 4.0.

## **BEAFAC UTILITY**

In addition to the above revisions, EPA updated the BEAFAC utility, which develops SCC and SIC code-level growth factors from the BEA's regional projections series. These factors are provided in EGAS as an alternative growth factor data set. Although the BEA series provides an EPA-approved source of projections data, the EPA suggests that EGAS 4.0 growth factors are preferable. The reasons for this recommendation are:

- 1) EGAS 4.0 growth factors provide additional geographic precision beyond the State-level BEA factors;
- 2) EGAS 4.0 growth factors are based on more current economic data and forecasts;
- 3) EGAS 4.0 growth factors provide more industry precision compared to the BEA factors; and
- 4) EGAS 4.0 growth factors incorporate emission sector-specific phenomena, such as energy efficiency improvements and the relationship between economic output and emissions activity changes, which the BEA's economic projections do not.

The BEA published their latest set of regional projections data in 1995.<sup>3</sup> There are no plans to update these projections in future years. The BEA projections series included in EGAS 3.0 provided forecasts for 1995, 2000, 2005, 2010, 2020, and 2040. As part of BEAFAC, EGAS Version 3.0 incorporated 1991-2015 growth factors developed from BEA's earnings projections. The final set of BEA projections, released in 1995, provide forecasts for the years 1998, 2000, 2005, 2010, 2015, 2025, and 2045. In addition to the earnings data provided in the previous set of BEA projections, this final projections series includes GSP (value added) projections by industry and State. For EGAS 4.0, point and area source growth factors were developed for 1997-2020 based on linear interpolation of the BEA value added data. The value added data were used because the EPA projections guidance states that value added data are preferred over earnings data in projecting emissions. Because of the addition of 2,600 SCCs, it was necessary to assign BEA projection categories to a number of new SCCs. Also, the previous BEAFAC did not include a complete set of projections data for the District of Columbia; BEAFAC was updated to include the BEA forecast data for the District of Columbia.

## REFERENCES

1. Regional Economic Models, Inc., "Economic Demographic Forecasting System (EDFS-14) Single Region U.S. Model," Amherst, MA. February 18, 1999.
2. U.S. Department of Energy, Energy Information Administration, Office of Integrated Analysis and Forecasting, "Annual Energy Outlook 1999, with Projections through 2020," DOE/EIA-0383(99), Washington, DC. December 1998.
3. U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, "Regional and State Projections of Economic Activity and Population to 2045: Volume 1, States," Washington, DC. July 1995.

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## **APPENDIX A**

### **EGAS 4.0 MODELING AREAS**

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**Table A-1. EGAS 4.0 Modeling Areas**

| Model Region | FIPS State | FIPS County | State      | County                |
|--------------|------------|-------------|------------|-----------------------|
| FW1          | 6          | 37          | California | Los Angeles County    |
| FW1          | 6          | 53          | California | Monterey County       |
| FW1          | 6          | 59          | California | Orange County         |
| FW1          | 6          | 65          | California | Riverside County      |
| FW1          | 6          | 69          | California | San Benito County     |
| FW1          | 6          | 71          | California | San Bernardino County |
| FW1          | 6          | 87          | California | Santa Cruz County     |
| FW2          | 6          | 73          | California | San Diego County      |
| FW3          | 6          | 111         | California | Ventura County        |
| FW4          | 6          | 17          | California | El Dorado County      |
| FW4          | 6          | 61          | California | Placer County         |
| FW4          | 6          | 67          | California | Sacramento County     |
| FW4          | 6          | 95          | California | Solano County         |
| FW4          | 6          | 101         | California | Sutter County         |
| FW4          | 6          | 113         | California | Yolo County           |
| FW5          | 6          | 19          | California | Fresno County         |
| FW5          | 6          | 29          | California | Kern County           |
| FW5          | 6          | 31          | California | Kings County          |
| FW5          | 6          | 39          | California | Madera County         |
| FW5          | 6          | 47          | California | Merced County         |
| FW5          | 6          | 77          | California | San Joaquin County    |
| FW5          | 6          | 99          | California | Stanislaus County     |
| FW5          | 6          | 107         | California | Tulare County         |
| FW6          | 6          | 1           | California | Alameda County        |
| FW6          | 6          | 3           | California | Alpine County         |
| FW6          | 6          | 5           | California | Amador County         |
| FW6          | 6          | 7           | California | Butte County          |
| FW6          | 6          | 9           | California | Calaveras County      |
| FW6          | 6          | 11          | California | Colusa County         |
| FW6          | 6          | 13          | California | Contra Costa County   |
| FW6          | 6          | 15          | California | Del Norte County      |
| FW6          | 6          | 21          | California | Glenn County          |
| FW6          | 6          | 23          | California | Humboldt County       |
| FW6          | 6          | 25          | California | Imperial County       |

| Model Region | FIPS State | FIPS County | State      | County                 |
|--------------|------------|-------------|------------|------------------------|
| FW6          | 6          | 27          | California | Inyo County            |
| FW6          | 6          | 33          | California | Lake County            |
| FW6          | 6          | 35          | California | Lassen County          |
| FW6          | 6          | 41          | California | Marin County           |
| FW6          | 6          | 43          | California | Mariposa County        |
| FW6          | 6          | 45          | California | Mendocino County       |
| FW6          | 6          | 49          | California | Modoc County           |
| FW6          | 6          | 51          | California | Mono County            |
| FW6          | 6          | 55          | California | Napa County            |
| FW6          | 6          | 57          | California | Nevada County          |
| FW6          | 6          | 63          | California | Plumas County          |
| FW6          | 6          | 75          | California | San Francisco County   |
| FW6          | 6          | 79          | California | San Luis Obispo County |
| FW6          | 6          | 81          | California | San Mateo County       |
| FW6          | 6          | 83          | California | Santa Barbara County   |
| FW6          | 6          | 85          | California | Santa Clara County     |
| FW6          | 6          | 89          | California | Shasta County          |
| FW6          | 6          | 91          | California | Sierra County          |
| FW6          | 6          | 93          | California | Siskiyou County        |
| FW6          | 6          | 97          | California | Sonoma County          |
| FW6          | 6          | 103         | California | Tehama County          |
| FW6          | 6          | 105         | California | Trinity County         |
| FW6          | 6          | 109         | California | Tuolumne County        |
| FW6          | 6          | 115         | California | Yuba County            |
| FW7          | 32         | 510         | Nevada     | Carson City            |
| FW7          | 32         | 1           | Nevada     | Churchill County       |
| FW7          | 32         | 3           | Nevada     | Clark County           |
| FW7          | 32         | 5           | Nevada     | Douglas County         |
| FW7          | 32         | 7           | Nevada     | Elko County            |
| FW7          | 32         | 9           | Nevada     | Esmeralda County       |
| FW7          | 32         | 11          | Nevada     | Eureka County          |
| FW7          | 32         | 13          | Nevada     | Humboldt County        |
| FW7          | 32         | 15          | Nevada     | Lander County          |
| FW7          | 32         | 17          | Nevada     | Lincoln County         |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State     | County            |
|--------------|------------|-------------|-----------|-------------------|
| FW7          | 32         | 19          | Nevada    | Lyon County       |
| FW7          | 32         | 21          | Nevada    | Mineral County    |
| FW7          | 32         | 23          | Nevada    | Nye County        |
| FW7          | 32         | 27          | Nevada    | Pershing County   |
| FW7          | 32         | 29          | Nevada    | Storey County     |
| FW7          | 32         | 31          | Nevada    | Washoe County     |
| FW7          | 32         | 33          | Nevada    | White Pine County |
| FW8          | 4          | 1           | Arizona   | Apache County     |
| FW8          | 4          | 3           | Arizona   | Cochise County    |
| FW8          | 4          | 5           | Arizona   | Coconino County   |
| FW8          | 4          | 7           | Arizona   | Gila County       |
| FW8          | 4          | 9           | Arizona   | Graham County     |
| FW8          | 4          | 11          | Arizona   | Greenlee County   |
| FW8          | 4          | 12          | Arizona   | La Paz County     |
| FW8          | 4          | 13          | Arizona   | Maricopa County   |
| FW8          | 4          | 15          | Arizona   | Mohave County     |
| FW8          | 4          | 17          | Arizona   | Navajo County     |
| FW8          | 4          | 19          | Arizona   | Pima County       |
| FW8          | 4          | 21          | Arizona   | Pinal County      |
| FW8          | 4          | 23          | Arizona   | Santa Cruz County |
| FW8          | 4          | 25          | Arizona   | Yavapai County    |
| FW8          | 4          | 27          | Arizona   | Yuma County       |
| G1           | 17         | 31          | Illinois  | Cook County       |
| G1           | 17         | 43          | Illinois  | Du Page County    |
| G1           | 17         | 63          | Illinois  | Grundy County     |
| G1           | 17         | 89          | Illinois  | Kane County       |
| G1           | 17         | 93          | Illinois  | Kendall County    |
| G1           | 17         | 97          | Illinois  | Lake County       |
| G1           | 18         | 89          | Indiana   | Lake County       |
| G1           | 17         | 111         | Illinois  | McHenry County    |
| G1           | 18         | 127         | Indiana   | Porter County     |
| G1           | 17         | 197         | Illinois  | Will County       |
| G2           | 55         | 59          | Wisconsin | Kenosha County    |
| G2           | 55         | 79          | Wisconsin | Milwaukee County  |

| Model Region | FIPS State | FIPS County | State     | County            |
|--------------|------------|-------------|-----------|-------------------|
| G2           | 55         | 89          | Wisconsin | Ozaukee County    |
| G2           | 55         | 101         | Wisconsin | Racine County     |
| G2           | 55         | 131         | Wisconsin | Washington County |
| G2           | 55         | 133         | Wisconsin | Waukesha County   |
| G3           | 26         | 121         | Michigan  | Muskegon County   |
| G4           | 55         | 117         | Wisconsin | Sheboygan County  |
| G5           | 21         | 15          | Kentucky  | Boone County      |
| G5           | 39         | 17          | Ohio      | Butler County     |
| G5           | 21         | 37          | Kentucky  | Campbell County   |
| G5           | 39         | 25          | Ohio      | Clermont County   |
| G5           | 39         | 61          | Ohio      | Hamilton County   |
| G5           | 21         | 117         | Kentucky  | Kenton County     |
| G5           | 39         | 165         | Ohio      | Warren County     |
| G6           | 29         | 71          | Missouri  | Franklin County   |
| G6           | 29         | 99          | Missouri  | Jefferson County  |
| G6           | 17         | 119         | Illinois  | Madison County    |
| G6           | 17         | 133         | Illinois  | Monroe County     |
| G6           | 29         | 183         | Missouri  | St Charles County |
| G6           | 17         | 163         | Illinois  | St Clair County   |
| G6           | 29         | 510         | Missouri  | St Louis City     |
| G6           | 29         | 189         | Missouri  | St Louis County   |
| G7           | 17         | 1           | Illinois  | Adams County      |
| G7           | 17         | 3           | Illinois  | Alexander County  |
| G7           | 17         | 5           | Illinois  | Bond County       |
| G7           | 17         | 7           | Illinois  | Boone County      |
| G7           | 17         | 9           | Illinois  | Brown County      |
| G7           | 17         | 11          | Illinois  | Bureau County     |
| G7           | 17         | 13          | Illinois  | Calhoun County    |
| G7           | 17         | 15          | Illinois  | Carroll County    |
| G7           | 17         | 17          | Illinois  | Cass County       |
| G7           | 17         | 19          | Illinois  | Champaign County  |
| G7           | 17         | 21          | Illinois  | Christian County  |
| G7           | 17         | 23          | Illinois  | Clark County      |
| G7           | 17         | 25          | Illinois  | Clay County       |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| G7           | 17         | 27          | Illinois | Clinton County    |
| G7           | 17         | 29          | Illinois | Coles County      |
| G7           | 17         | 33          | Illinois | Crawford County   |
| G7           | 17         | 35          | Illinois | Cumberland County |
| G7           | 17         | 37          | Illinois | De Kalb County    |
| G7           | 17         | 39          | Illinois | De Witt County    |
| G7           | 17         | 41          | Illinois | Douglas County    |
| G7           | 17         | 45          | Illinois | Edgar County      |
| G7           | 17         | 47          | Illinois | Edwards County    |
| G7           | 17         | 49          | Illinois | Effingham County  |
| G7           | 17         | 51          | Illinois | Fayette County    |
| G7           | 17         | 53          | Illinois | Ford County       |
| G7           | 17         | 55          | Illinois | Franklin County   |
| G7           | 17         | 57          | Illinois | Fulton County     |
| G7           | 17         | 59          | Illinois | Gallatin County   |
| G7           | 17         | 61          | Illinois | Greene County     |
| G7           | 17         | 65          | Illinois | Hamilton County   |
| G7           | 17         | 67          | Illinois | Hancock County    |
| G7           | 17         | 69          | Illinois | Hardin County     |
| G7           | 17         | 71          | Illinois | Henderson County  |
| G7           | 17         | 73          | Illinois | Henry County      |
| G7           | 17         | 75          | Illinois | Iroquois County   |
| G7           | 17         | 77          | Illinois | Jackson County    |
| G7           | 17         | 79          | Illinois | Jasper County     |
| G7           | 17         | 81          | Illinois | Jefferson County  |
| G7           | 17         | 83          | Illinois | Jersey County     |
| G7           | 17         | 85          | Illinois | Jo Davies County  |
| G7           | 17         | 87          | Illinois | Johnson County    |
| G7           | 17         | 91          | Illinois | Kankakee County   |
| G7           | 17         | 95          | Illinois | Knox County       |
| G7           | 17         | 99          | Illinois | La Salle County   |
| G7           | 17         | 101         | Illinois | Lawrence County   |
| G7           | 17         | 103         | Illinois | Lee County        |
| G7           | 17         | 105         | Illinois | Livingston County |

| Model Region | FIPS State | FIPS County | State    | County             |
|--------------|------------|-------------|----------|--------------------|
| G7           | 17         | 107         | Illinois | Logan County       |
| G7           | 17         | 115         | Illinois | Macon County       |
| G7           | 17         | 117         | Illinois | Macoupin County    |
| G7           | 17         | 121         | Illinois | Marion County      |
| G7           | 17         | 123         | Illinois | Marshall County    |
| G7           | 17         | 125         | Illinois | Mason County       |
| G7           | 17         | 127         | Illinois | Massac County      |
| G7           | 17         | 109         | Illinois | McDonough County   |
| G7           | 17         | 113         | Illinois | McLean County      |
| G7           | 17         | 129         | Illinois | Menard County      |
| G7           | 17         | 131         | Illinois | Mercer County      |
| G7           | 17         | 135         | Illinois | Montgomery County  |
| G7           | 17         | 137         | Illinois | Morgan County      |
| G7           | 17         | 139         | Illinois | Moultrie County    |
| G7           | 17         | 141         | Illinois | Ogle County        |
| G7           | 17         | 143         | Illinois | Peoria County      |
| G7           | 17         | 145         | Illinois | Perry County       |
| G7           | 17         | 147         | Illinois | Piatt County       |
| G7           | 17         | 149         | Illinois | Pike County        |
| G7           | 17         | 151         | Illinois | Pope County        |
| G7           | 17         | 153         | Illinois | Pulaski County     |
| G7           | 17         | 155         | Illinois | Putnam County      |
| G7           | 17         | 157         | Illinois | Randolph County    |
| G7           | 17         | 159         | Illinois | Richland County    |
| G7           | 17         | 161         | Illinois | Rock Island County |
| G7           | 17         | 165         | Illinois | Saline County      |
| G7           | 17         | 167         | Illinois | Sangamon County    |
| G7           | 17         | 169         | Illinois | Schuyler County    |
| G7           | 17         | 171         | Illinois | Scott County       |
| G7           | 17         | 173         | Illinois | Shelby County      |
| G7           | 17         | 175         | Illinois | Stark County       |
| G7           | 17         | 177         | Illinois | Stephenson County  |
| G7           | 17         | 179         | Illinois | Tazewell County    |
| G7           | 17         | 181         | Illinois | Union County       |



Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County             |
|--------------|------------|-------------|----------|--------------------|
| G7           | 17         | 183         | Illinois | Vermilion County   |
| G7           | 17         | 185         | Illinois | Wabash County      |
| G7           | 17         | 187         | Illinois | Warren County      |
| G7           | 17         | 189         | Illinois | Washington County  |
| G7           | 17         | 191         | Illinois | Wayne County       |
| G7           | 17         | 193         | Illinois | White County       |
| G7           | 17         | 195         | Illinois | Whiteside County   |
| G7           | 17         | 199         | Illinois | Williamson County  |
| G7           | 17         | 201         | Illinois | Winnebago County   |
| G7           | 17         | 203         | Illinois | Woodford County    |
| G8           | 18         | 1           | Indiana  | Adams County       |
| G8           | 18         | 3           | Indiana  | Allen County       |
| G8           | 18         | 5           | Indiana  | Bartholomew County |
| G8           | 18         | 7           | Indiana  | Benton County      |
| G8           | 18         | 9           | Indiana  | Blackford County   |
| G8           | 18         | 11          | Indiana  | Boone County       |
| G8           | 18         | 13          | Indiana  | Brown County       |
| G8           | 18         | 15          | Indiana  | Carroll County     |
| G8           | 18         | 17          | Indiana  | Cass County        |
| G8           | 18         | 21          | Indiana  | Clay County        |
| G8           | 18         | 23          | Indiana  | Clinton County     |
| G8           | 18         | 25          | Indiana  | Crawford County    |
| G8           | 18         | 27          | Indiana  | Daviess County     |
| G8           | 18         | 33          | Indiana  | De Kalb County     |
| G8           | 18         | 29          | Indiana  | Dearborn County    |
| G8           | 18         | 31          | Indiana  | Decatur County     |
| G8           | 18         | 35          | Indiana  | Delaware County    |
| G8           | 18         | 37          | Indiana  | Dubois County      |
| G8           | 18         | 39          | Indiana  | Elkhart County     |
| G8           | 18         | 41          | Indiana  | Fayette County     |
| G8           | 18         | 45          | Indiana  | Fountain County    |
| G8           | 18         | 47          | Indiana  | Franklin County    |
| G8           | 18         | 49          | Indiana  | Fulton County      |
| G8           | 18         | 51          | Indiana  | Gibson County      |

| Model Region | FIPS State | FIPS County | State   | County            |
|--------------|------------|-------------|---------|-------------------|
| G8           | 18         | 53          | Indiana | Grant County      |
| G8           | 18         | 55          | Indiana | Greene County     |
| G8           | 18         | 57          | Indiana | Hamilton County   |
| G8           | 18         | 59          | Indiana | Hancock County    |
| G8           | 18         | 61          | Indiana | Harrison County   |
| G8           | 18         | 63          | Indiana | Hendricks County  |
| G8           | 18         | 65          | Indiana | Henry County      |
| G8           | 18         | 67          | Indiana | Howard County     |
| G8           | 18         | 69          | Indiana | Huntington County |
| G8           | 18         | 71          | Indiana | Jackson County    |
| G8           | 18         | 73          | Indiana | Jasper County     |
| G8           | 18         | 75          | Indiana | Jay County        |
| G8           | 18         | 77          | Indiana | Jefferson County  |
| G8           | 18         | 79          | Indiana | Jennings County   |
| G8           | 18         | 81          | Indiana | Johnson County    |
| G8           | 18         | 83          | Indiana | Knox County       |
| G8           | 18         | 85          | Indiana | Kosciusko County  |
| G8           | 18         | 91          | Indiana | La Porte County   |
| G8           | 18         | 87          | Indiana | Lagrange County   |
| G8           | 18         | 93          | Indiana | Lawrence County   |
| G8           | 18         | 95          | Indiana | Madison County    |
| G8           | 18         | 97          | Indiana | Marion County     |
| G8           | 18         | 99          | Indiana | Marshall County   |
| G8           | 18         | 101         | Indiana | Martin County     |
| G8           | 18         | 103         | Indiana | Miami County      |
| G8           | 18         | 105         | Indiana | Monroe County     |
| G8           | 18         | 107         | Indiana | Montgomery County |
| G8           | 18         | 109         | Indiana | Morgan County     |
| G8           | 18         | 111         | Indiana | Newton County     |
| G8           | 18         | 113         | Indiana | Noble County      |
| G8           | 18         | 115         | Indiana | Ohio County       |
| G8           | 18         | 117         | Indiana | Orange County     |
| G8           | 18         | 119         | Indiana | Owen County       |
| G8           | 18         | 121         | Indiana | Parke County      |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State     | County             |
|--------------|------------|-------------|-----------|--------------------|
| G8           | 18         | 123         | Indiana   | Perry County       |
| G8           | 18         | 125         | Indiana   | Pike County        |
| G8           | 18         | 129         | Indiana   | Posey County       |
| G8           | 18         | 131         | Indiana   | Pulaski County     |
| G8           | 18         | 133         | Indiana   | Putnam County      |
| G8           | 18         | 135         | Indiana   | Randolph County    |
| G8           | 18         | 137         | Indiana   | Ripley County      |
| G8           | 18         | 139         | Indiana   | Rush County        |
| G8           | 18         | 143         | Indiana   | Scott County       |
| G8           | 18         | 145         | Indiana   | Shelby County      |
| G8           | 18         | 147         | Indiana   | Spencer County     |
| G8           | 18         | 141         | Indiana   | St Joseph County   |
| G8           | 18         | 149         | Indiana   | Starke County      |
| G8           | 18         | 151         | Indiana   | Steuben County     |
| G8           | 18         | 153         | Indiana   | Sullivan County    |
| G8           | 18         | 155         | Indiana   | Switzerland County |
| G8           | 18         | 157         | Indiana   | Tippecanoe County  |
| G8           | 18         | 159         | Indiana   | Tipton County      |
| G8           | 18         | 161         | Indiana   | Union County       |
| G8           | 18         | 163         | Indiana   | Vanderburgh County |
| G8           | 18         | 165         | Indiana   | Vermillion County  |
| G8           | 18         | 167         | Indiana   | Vigo County        |
| G8           | 18         | 169         | Indiana   | Wabash County      |
| G8           | 18         | 171         | Indiana   | Warren County      |
| G8           | 18         | 173         | Indiana   | Warrick County     |
| G8           | 18         | 175         | Indiana   | Washington County  |
| G8           | 18         | 177         | Indiana   | Wayne County       |
| G8           | 18         | 179         | Indiana   | Wells County       |
| G8           | 18         | 181         | Indiana   | White County       |
| G8           | 18         | 183         | Indiana   | Whitley County     |
| G9           | 55         | 1           | Wisconsin | Adams County       |
| G9           | 55         | 3           | Wisconsin | Ashland County     |
| G9           | 55         | 5           | Wisconsin | Barron County      |
| G9           | 55         | 7           | Wisconsin | Bayfield County    |

| Model Region | FIPS State | FIPS County | State     | County             |
|--------------|------------|-------------|-----------|--------------------|
| G9           | 55         | 9           | Wisconsin | Brown County       |
| G9           | 55         | 11          | Wisconsin | Buffalo County     |
| G9           | 55         | 13          | Wisconsin | Burnett County     |
| G9           | 55         | 15          | Wisconsin | Calumet County     |
| G9           | 55         | 17          | Wisconsin | Chippewa County    |
| G9           | 55         | 19          | Wisconsin | Clark County       |
| G9           | 55         | 21          | Wisconsin | Columbia County    |
| G9           | 55         | 23          | Wisconsin | Crawford County    |
| G9           | 55         | 25          | Wisconsin | Dane County        |
| G9           | 55         | 27          | Wisconsin | Dodge County       |
| G9           | 55         | 29          | Wisconsin | Door County        |
| G9           | 55         | 31          | Wisconsin | Douglas County     |
| G9           | 55         | 33          | Wisconsin | Dunn County        |
| G9           | 55         | 35          | Wisconsin | Eau Claire County  |
| G9           | 55         | 37          | Wisconsin | Florence County    |
| G9           | 55         | 39          | Wisconsin | Fond Du Lac County |
| G9           | 55         | 41          | Wisconsin | Forest County      |
| G9           | 55         | 43          | Wisconsin | Grant County       |
| G9           | 55         | 45          | Wisconsin | Green County       |
| G9           | 55         | 47          | Wisconsin | Green Lake County  |
| G9           | 55         | 49          | Wisconsin | Iowa County        |
| G9           | 55         | 51          | Wisconsin | Iron County        |
| G9           | 55         | 53          | Wisconsin | Jackson County     |
| G9           | 55         | 55          | Wisconsin | Jefferson County   |
| G9           | 55         | 57          | Wisconsin | Juneau County      |
| G9           | 55         | 61          | Wisconsin | Kewaunee County    |
| G9           | 55         | 63          | Wisconsin | La Crosse County   |
| G9           | 55         | 65          | Wisconsin | Lafayette County   |
| G9           | 55         | 67          | Wisconsin | Langlade County    |
| G9           | 55         | 69          | Wisconsin | Lincoln County     |
| G9           | 55         | 71          | Wisconsin | Manitowoc County   |
| G9           | 55         | 73          | Wisconsin | Marathon County    |
| G9           | 55         | 75          | Wisconsin | Marinette County   |
| G9           | 55         | 77          | Wisconsin | Marquette County   |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State     | County             |
|--------------|------------|-------------|-----------|--------------------|
| G9           | 55         | 78          | Wisconsin | Menominee County   |
| G9           | 55         | 81          | Wisconsin | Monroe County      |
| G9           | 55         | 83          | Wisconsin | Oconto County      |
| G9           | 55         | 85          | Wisconsin | Oneida County      |
| G9           | 55         | 87          | Wisconsin | Outagamie County   |
| G9           | 55         | 91          | Wisconsin | Pepin County       |
| G9           | 55         | 93          | Wisconsin | Pierce County      |
| G9           | 55         | 95          | Wisconsin | Polk County        |
| G9           | 55         | 97          | Wisconsin | Portage County     |
| G9           | 55         | 99          | Wisconsin | Price County       |
| G9           | 55         | 103         | Wisconsin | Richland County    |
| G9           | 55         | 105         | Wisconsin | Rock County        |
| G9           | 55         | 107         | Wisconsin | Rusk County        |
| G9           | 55         | 111         | Wisconsin | Sauk County        |
| G9           | 55         | 113         | Wisconsin | Sawyer County      |
| G9           | 55         | 115         | Wisconsin | Shawano County     |
| G9           | 55         | 109         | Wisconsin | St Croix County    |
| G9           | 55         | 119         | Wisconsin | Taylor County      |
| G9           | 55         | 121         | Wisconsin | Trempealeau County |
| G9           | 55         | 123         | Wisconsin | Vernon County      |
| G9           | 55         | 125         | Wisconsin | Vilas County       |
| G9           | 55         | 127         | Wisconsin | Walworth County    |
| G9           | 55         | 129         | Wisconsin | Washburn County    |
| G9           | 55         | 135         | Wisconsin | Waupaca County     |
| G9           | 55         | 137         | Wisconsin | Waushara County    |
| G9           | 55         | 139         | Wisconsin | Winnebago County   |
| G9           | 55         | 141         | Wisconsin | Wood County        |
| G10          | 39         | 1           | Ohio      | Adams County       |
| G10          | 39         | 3           | Ohio      | Allen County       |
| G10          | 39         | 5           | Ohio      | Ashland County     |
| G10          | 39         | 7           | Ohio      | Ashtabula County   |
| G10          | 39         | 9           | Ohio      | Athens County      |
| G10          | 39         | 11          | Ohio      | Auglaize County    |
| G10          | 39         | 13          | Ohio      | Belmont County     |

| Model Region | FIPS State | FIPS County | State | County            |
|--------------|------------|-------------|-------|-------------------|
| G10          | 39         | 15          | Ohio  | Brown County      |
| G10          | 39         | 19          | Ohio  | Carroll County    |
| G10          | 39         | 21          | Ohio  | Champaign County  |
| G10          | 39         | 23          | Ohio  | Clark County      |
| G10          | 39         | 27          | Ohio  | Clinton County    |
| G10          | 39         | 29          | Ohio  | Columbiana County |
| G10          | 39         | 31          | Ohio  | Coshocton County  |
| G10          | 39         | 33          | Ohio  | Crawford County   |
| G10          | 39         | 35          | Ohio  | Cuyahoga County   |
| G10          | 39         | 37          | Ohio  | Darke County      |
| G10          | 39         | 39          | Ohio  | Defiance County   |
| G10          | 39         | 41          | Ohio  | Delaware County   |
| G10          | 39         | 43          | Ohio  | Erie County       |
| G10          | 39         | 45          | Ohio  | Fairfield County  |
| G10          | 39         | 47          | Ohio  | Fayette County    |
| G10          | 39         | 49          | Ohio  | Franklin County   |
| G10          | 39         | 51          | Ohio  | Fulton County     |
| G10          | 39         | 53          | Ohio  | Gallia County     |
| G10          | 39         | 55          | Ohio  | Geauga County     |
| G10          | 39         | 57          | Ohio  | Greene County     |
| G10          | 39         | 59          | Ohio  | Guernsey County   |
| G10          | 39         | 63          | Ohio  | Hancock County    |
| G10          | 39         | 65          | Ohio  | Hardin County     |
| G10          | 39         | 67          | Ohio  | Harrison County   |
| G10          | 39         | 69          | Ohio  | Henry County      |
| G10          | 39         | 71          | Ohio  | Highland County   |
| G10          | 39         | 73          | Ohio  | Hocking County    |
| G10          | 39         | 75          | Ohio  | Holmes County     |
| G10          | 39         | 77          | Ohio  | Huron County      |
| G10          | 39         | 79          | Ohio  | Jackson County    |
| G10          | 39         | 81          | Ohio  | Jefferson County  |
| G10          | 39         | 83          | Ohio  | Knox County       |
| G10          | 39         | 85          | Ohio  | Lake County       |
| G10          | 39         | 87          | Ohio  | Lawrence County   |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State | County            |
|--------------|------------|-------------|-------|-------------------|
| G10          | 39         | 89          | Ohio  | Licking County    |
| G10          | 39         | 91          | Ohio  | Logan County      |
| G10          | 39         | 93          | Ohio  | Lorain County     |
| G10          | 39         | 95          | Ohio  | Lucas County      |
| G10          | 39         | 97          | Ohio  | Madison County    |
| G10          | 39         | 99          | Ohio  | Mahoning County   |
| G10          | 39         | 101         | Ohio  | Marion County     |
| G10          | 39         | 103         | Ohio  | Medina County     |
| G10          | 39         | 105         | Ohio  | Meigs County      |
| G10          | 39         | 107         | Ohio  | Mercer County     |
| G10          | 39         | 109         | Ohio  | Miami County      |
| G10          | 39         | 111         | Ohio  | Monroe County     |
| G10          | 39         | 113         | Ohio  | Montgomery County |
| G10          | 39         | 115         | Ohio  | Morgan County     |
| G10          | 39         | 117         | Ohio  | Morrow County     |
| G10          | 39         | 119         | Ohio  | Muskingum County  |
| G10          | 39         | 121         | Ohio  | Noble County      |
| G10          | 39         | 123         | Ohio  | Ottawa County     |
| G10          | 39         | 125         | Ohio  | Paulding County   |
| G10          | 39         | 127         | Ohio  | Perry County      |
| G10          | 39         | 129         | Ohio  | Pickaway County   |
| G10          | 39         | 131         | Ohio  | Pike County       |
| G10          | 39         | 133         | Ohio  | Portage County    |
| G10          | 39         | 135         | Ohio  | Preble County     |
| G10          | 39         | 137         | Ohio  | Putnam County     |
| G10          | 39         | 139         | Ohio  | Richland County   |
| G10          | 39         | 141         | Ohio  | Ross County       |
| G10          | 39         | 143         | Ohio  | Sandusky County   |
| G10          | 39         | 145         | Ohio  | Scioto County     |
| G10          | 39         | 147         | Ohio  | Seneca County     |
| G10          | 39         | 149         | Ohio  | Shelby County     |
| G10          | 39         | 151         | Ohio  | Stark County      |
| G10          | 39         | 153         | Ohio  | Summit County     |
| G10          | 39         | 155         | Ohio  | Trumbull County   |

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| G10          | 39         | 157         | Ohio     | Tuscarawas County |
| G10          | 39         | 159         | Ohio     | Union County      |
| G10          | 39         | 161         | Ohio     | Van Wert County   |
| G10          | 39         | 163         | Ohio     | Vinton County     |
| G10          | 39         | 167         | Ohio     | Washington County |
| G10          | 39         | 169         | Ohio     | Wayne County      |
| G10          | 39         | 171         | Ohio     | Williams County   |
| G10          | 39         | 173         | Ohio     | Wood County       |
| G10          | 39         | 175         | Ohio     | Wyandot County    |
| G11          | 26         | 1           | Michigan | Alcona County     |
| G11          | 26         | 3           | Michigan | Alger County      |
| G11          | 26         | 5           | Michigan | Allegan County    |
| G11          | 26         | 7           | Michigan | Alpena County     |
| G11          | 26         | 9           | Michigan | Antrim County     |
| G11          | 26         | 11          | Michigan | Arenac County     |
| G11          | 26         | 13          | Michigan | Baraga County     |
| G11          | 26         | 15          | Michigan | Barry County      |
| G11          | 26         | 17          | Michigan | Bay County        |
| G11          | 26         | 19          | Michigan | Benzie County     |
| G11          | 26         | 21          | Michigan | Berrien County    |
| G11          | 26         | 23          | Michigan | Branch County     |
| G11          | 26         | 25          | Michigan | Calhoun County    |
| G11          | 26         | 27          | Michigan | Cass County       |
| G11          | 26         | 29          | Michigan | Charlevoix County |
| G11          | 26         | 31          | Michigan | Cheboygan County  |
| G11          | 26         | 33          | Michigan | Chippewa County   |
| G11          | 26         | 35          | Michigan | Clare County      |
| G11          | 26         | 37          | Michigan | Clinton County    |
| G11          | 26         | 39          | Michigan | Crawford County   |
| G11          | 26         | 41          | Michigan | Delta County      |
| G11          | 26         | 43          | Michigan | Dickinson County  |
| G11          | 26         | 45          | Michigan | Eaton County      |
| G11          | 26         | 47          | Michigan | Emmet County      |
| G11          | 26         | 49          | Michigan | Genesee County    |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County                |
|--------------|------------|-------------|----------|-----------------------|
| G11          | 26         | 51          | Michigan | Gladwin County        |
| G11          | 26         | 53          | Michigan | Gogebic County        |
| G11          | 26         | 55          | Michigan | Grand Traverse County |
| G11          | 26         | 57          | Michigan | Gratiot County        |
| G11          | 26         | 59          | Michigan | Hillsdale County      |
| G11          | 26         | 61          | Michigan | Houghton County       |
| G11          | 26         | 63          | Michigan | Huron County          |
| G11          | 26         | 65          | Michigan | Ingham County         |
| G11          | 26         | 67          | Michigan | Ionia County          |
| G11          | 26         | 69          | Michigan | Iosco County          |
| G11          | 26         | 71          | Michigan | Iron County           |
| G11          | 26         | 73          | Michigan | Isabella County       |
| G11          | 26         | 75          | Michigan | Jackson County        |
| G11          | 26         | 77          | Michigan | Kalamazoo County      |
| G11          | 26         | 79          | Michigan | Kalkaska County       |
| G11          | 26         | 81          | Michigan | Kent County           |
| G11          | 26         | 83          | Michigan | Keweenaw County       |
| G11          | 26         | 85          | Michigan | Lake County           |
| G11          | 26         | 87          | Michigan | Lapeer County         |
| G11          | 26         | 89          | Michigan | Leelanau County       |
| G11          | 26         | 91          | Michigan | Lenawee County        |
| G11          | 26         | 93          | Michigan | Livingston County     |
| G11          | 26         | 95          | Michigan | Luce County           |
| G11          | 26         | 97          | Michigan | Mackinac County       |
| G11          | 26         | 99          | Michigan | Macomb County         |
| G11          | 26         | 101         | Michigan | Manistee County       |
| G11          | 26         | 103         | Michigan | Marquette County      |
| G11          | 26         | 105         | Michigan | Mason County          |
| G11          | 26         | 107         | Michigan | Mecosta County        |
| G11          | 26         | 109         | Michigan | Menominee County      |
| G11          | 26         | 111         | Michigan | Midland County        |
| G11          | 26         | 113         | Michigan | Missaukee County      |
| G11          | 26         | 115         | Michigan | Monroe County         |
| G11          | 26         | 117         | Michigan | Montcalm County       |

| Model Region | FIPS State | FIPS County | State     | County              |
|--------------|------------|-------------|-----------|---------------------|
| G11          | 26         | 119         | Michigan  | Montmorency County  |
| G11          | 26         | 123         | Michigan  | Newaygo County      |
| G11          | 26         | 125         | Michigan  | Oakland County      |
| G11          | 26         | 127         | Michigan  | Oceana County       |
| G11          | 26         | 129         | Michigan  | Ogemaw County       |
| G11          | 26         | 131         | Michigan  | Ontonagon County    |
| G11          | 26         | 133         | Michigan  | Osceola County      |
| G11          | 26         | 135         | Michigan  | Oscoda County       |
| G11          | 26         | 137         | Michigan  | Otsego County       |
| G11          | 26         | 139         | Michigan  | Ottawa County       |
| G11          | 26         | 141         | Michigan  | Presque Isle County |
| G11          | 26         | 143         | Michigan  | Roscommon County    |
| G11          | 26         | 145         | Michigan  | Saginaw County      |
| G11          | 26         | 151         | Michigan  | Sanilac County      |
| G11          | 26         | 153         | Michigan  | Schoolcraft County  |
| G11          | 26         | 155         | Michigan  | Shiawassee County   |
| G11          | 26         | 147         | Michigan  | St Clair County     |
| G11          | 26         | 149         | Michigan  | St Joseph County    |
| G11          | 26         | 157         | Michigan  | Tuscola County      |
| G11          | 26         | 159         | Michigan  | Van Buren County    |
| G11          | 26         | 161         | Michigan  | Washtenaw County    |
| G11          | 26         | 163         | Michigan  | Wayne County        |
| G11          | 26         | 165         | Michigan  | Wexford County      |
| G12          | 27         | 1           | Minnesota | Aitkin County       |
| G12          | 27         | 3           | Minnesota | Anoka County        |
| G12          | 27         | 5           | Minnesota | Becker County       |
| G12          | 27         | 7           | Minnesota | Beltrami County     |
| G12          | 27         | 9           | Minnesota | Benton County       |
| G12          | 27         | 11          | Minnesota | Big Stone County    |
| G12          | 27         | 13          | Minnesota | Blue Earth County   |
| G12          | 27         | 15          | Minnesota | Brown County        |
| G12          | 27         | 17          | Minnesota | Carlton County      |
| G12          | 27         | 19          | Minnesota | Carver County       |
| G12          | 27         | 21          | Minnesota | Cass County         |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State     | County                 |
|--------------|------------|-------------|-----------|------------------------|
| G12          | 27         | 23          | Minnesota | Chippewa County        |
| G12          | 27         | 25          | Minnesota | Chisago County         |
| G12          | 27         | 27          | Minnesota | Clay County            |
| G12          | 27         | 29          | Minnesota | Clearwater County      |
| G12          | 27         | 31          | Minnesota | Cook County            |
| G12          | 27         | 33          | Minnesota | Cottonwood County      |
| G12          | 27         | 35          | Minnesota | Crow Wing County       |
| G12          | 27         | 37          | Minnesota | Dakota County          |
| G12          | 27         | 39          | Minnesota | Dodge County           |
| G12          | 27         | 41          | Minnesota | Douglas County         |
| G12          | 27         | 43          | Minnesota | Faribault County       |
| G12          | 27         | 45          | Minnesota | Fillmore County        |
| G12          | 27         | 47          | Minnesota | Freeborn County        |
| G12          | 27         | 49          | Minnesota | Goodhue County         |
| G12          | 27         | 51          | Minnesota | Grant County           |
| G12          | 27         | 53          | Minnesota | Hennepin County        |
| G12          | 27         | 55          | Minnesota | Houston County         |
| G12          | 27         | 57          | Minnesota | Hubbard County         |
| G12          | 27         | 59          | Minnesota | Isanti County          |
| G12          | 27         | 61          | Minnesota | Itasca County          |
| G12          | 27         | 63          | Minnesota | Jackson County         |
| G12          | 27         | 65          | Minnesota | Kanabec County         |
| G12          | 27         | 67          | Minnesota | Kandiyohi County       |
| G12          | 27         | 69          | Minnesota | Kittson County         |
| G12          | 27         | 71          | Minnesota | Koochiching County     |
| G12          | 27         | 73          | Minnesota | Lac Qui Parle County   |
| G12          | 27         | 75          | Minnesota | Lake County            |
| G12          | 27         | 77          | Minnesota | Lake Of The Woo County |
| G12          | 27         | 79          | Minnesota | Le Sueur County        |
| G12          | 27         | 81          | Minnesota | Lincoln County         |
| G12          | 27         | 83          | Minnesota | Lyon County            |
| G12          | 27         | 87          | Minnesota | Mahnomen County        |
| G12          | 27         | 89          | Minnesota | Marshall County        |
| G12          | 27         | 91          | Minnesota | Martin County          |

| Model Region | FIPS State | FIPS County | State     | County            |
|--------------|------------|-------------|-----------|-------------------|
| G12          | 27         | 85          | Minnesota | Mc Leod County    |
| G12          | 27         | 93          | Minnesota | Meeker County     |
| G12          | 27         | 95          | Minnesota | Mille Lacs County |
| G12          | 27         | 97          | Minnesota | Morrison County   |
| G12          | 27         | 99          | Minnesota | Mower County      |
| G12          | 27         | 101         | Minnesota | Murray County     |
| G12          | 27         | 103         | Minnesota | Nicollet County   |
| G12          | 27         | 105         | Minnesota | Nobles County     |
| G12          | 27         | 107         | Minnesota | Norman County     |
| G12          | 27         | 109         | Minnesota | Olmsted County    |
| G12          | 27         | 111         | Minnesota | Otter Tail County |
| G12          | 27         | 113         | Minnesota | Pennington County |
| G12          | 27         | 115         | Minnesota | Pine County       |
| G12          | 27         | 117         | Minnesota | Pipestone County  |
| G12          | 27         | 119         | Minnesota | Polk County       |
| G12          | 27         | 121         | Minnesota | Pope County       |
| G12          | 27         | 123         | Minnesota | Ramsey County     |
| G12          | 27         | 125         | Minnesota | Red Lake County   |
| G12          | 27         | 127         | Minnesota | Redwood County    |
| G12          | 27         | 129         | Minnesota | Renville County   |
| G12          | 27         | 131         | Minnesota | Rice County       |
| G12          | 27         | 133         | Minnesota | Rock County       |
| G12          | 27         | 135         | Minnesota | Roseau County     |
| G12          | 27         | 139         | Minnesota | Scott County      |
| G12          | 27         | 141         | Minnesota | Sherburne County  |
| G12          | 27         | 143         | Minnesota | Sibley County     |
| G12          | 27         | 137         | Minnesota | St Louis County   |
| G12          | 27         | 145         | Minnesota | Stearns County    |
| G12          | 27         | 147         | Minnesota | Steele County     |
| G12          | 27         | 149         | Minnesota | Stevens County    |
| G12          | 27         | 151         | Minnesota | Swift County      |
| G12          | 27         | 153         | Minnesota | Todd County       |
| G12          | 27         | 155         | Minnesota | Traverse County   |
| G12          | 27         | 157         | Minnesota | Wabasha County    |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State       | County                 |
|--------------|------------|-------------|-------------|------------------------|
| G12          | 27         | 159         | Minnesota   | Wadena County          |
| G12          | 27         | 161         | Minnesota   | Waseca County          |
| G12          | 27         | 163         | Minnesota   | Washington County      |
| G12          | 27         | 165         | Minnesota   | Watonwan County        |
| G12          | 27         | 167         | Minnesota   | Wilkin County          |
| G12          | 27         | 169         | Minnesota   | Winona County          |
| G12          | 27         | 171         | Minnesota   | Wright County          |
| G12          | 27         | 173         | Minnesota   | Yellow Medicine County |
| M1           | 34         | 3           | New Jersey  | Bergen County          |
| M1           | 36         | 5           | New York    | Bronx County           |
| M1           | 34         | 13          | New Jersey  | Essex County           |
| M1           | 9          | 1           | Connecticut | Fairfield County       |
| M1           | 34         | 17          | New Jersey  | Hudson County          |
| M1           | 34         | 19          | New Jersey  | Hunterdon County       |
| M1           | 36         | 47          | New York    | Kings County           |
| M1           | 9          | 5           | Connecticut | Litchfield County      |
| M1           | 34         | 23          | New Jersey  | Middlesex County       |
| M1           | 34         | 25          | New Jersey  | Monmouth County        |
| M1           | 34         | 27          | New Jersey  | Morris County          |
| M1           | 36         | 59          | New York    | Nassau County          |
| M1           | 36         | 61          | New York    | New York County        |
| M1           | 34         | 29          | New Jersey  | Ocean County           |
| M1           | 36         | 71          | New York    | Orange County          |
| M1           | 34         | 31          | New Jersey  | Passaic County         |
| M1           | 36         | 79          | New York    | Putnam County          |
| M1           | 36         | 81          | New York    | Queens County          |
| M1           | 36         | 85          | New York    | Richmond County        |
| M1           | 36         | 87          | New York    | Rockland County        |
| M1           | 34         | 35          | New Jersey  | Somerset County        |
| M1           | 36         | 103         | New York    | Suffolk County         |
| M1           | 34         | 37          | New Jersey  | Sussex County          |
| M1           | 34         | 39          | New Jersey  | Union County           |
| M1           | 36         | 119         | New York    | Westchester County     |
| M2           | 24         | 3           | Maryland    | Anne Arundel County    |

| Model Region | FIPS State | FIPS County | State                | County                |
|--------------|------------|-------------|----------------------|-----------------------|
| M2           | 24         | 510         | Maryland             | Baltimore City        |
| M2           | 24         | 5           | Maryland             | Baltimore County      |
| M2           | 24         | 13          | Maryland             | Carroll County        |
| M2           | 24         | 25          | Maryland             | Harford County        |
| M2           | 24         | 27          | Maryland             | Howard County         |
| M3           | 42         | 17          | Pennsylvania         | Bucks County          |
| M3           | 34         | 5           | New Jersey           | Burlington County     |
| M3           | 34         | 7           | New Jersey           | Camden County         |
| M3           | 24         | 15          | Maryland             | Cecil County          |
| M3           | 42         | 29          | Pennsylvania         | Chester County        |
| M3           | 34         | 11          | New Jersey           | Cumberland County     |
| M3           | 42         | 45          | Pennsylvania         | Delaware County       |
| M3           | 34         | 15          | New Jersey           | Gloucester County     |
| M3           | 10         | 1           | Delaware             | Kent County           |
| M3           | 34         | 21          | New Jersey           | Mercer County         |
| M3           | 42         | 91          | Pennsylvania         | Montgomery County     |
| M3           | 10         | 3           | Delaware             | New Castle County     |
| M3           | 42         | 101         | Pennsylvania         | Philadelphia County   |
| M3           | 34         | 33          | New Jersey           | Salem County          |
| M4           | 51         | 510         | Virginia             | Alexandria            |
| M4           | 51         | 13          | Virginia             | Arlington County      |
| M4           | 24         | 9           | Maryland             | Calvert County        |
| M4           | 24         | 17          | Maryland             | Charles County        |
| M4           | 11         | 1           | District of Columbia | District of Columbia  |
| M4           | 51         | 600         | Virginia             | Fairfax               |
| M4           | 51         | 59          | Virginia             | Fairfax County        |
| M4           | 51         | 610         | Virginia             | Falls Church          |
| M4           | 24         | 21          | Maryland             | Frederick County      |
| M4           | 51         | 107         | Virginia             | Loudoun County        |
| M4           | 51         | 683         | Virginia             | Manassas              |
| M4           | 51         | 685         | Virginia             | Manassas Park         |
| M4           | 24         | 31          | Maryland             | Montgomery County     |
| M4           | 24         | 33          | Maryland             | Prince Georges County |
| M4           | 51         | 153         | Virginia             | Prince William County |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State         | County             |
|--------------|------------|-------------|---------------|--------------------|
| M4           | 51         | 179         | Virginia      | Stafford County    |
| M5           | 21         | 19          | Kentucky      | Boyd County        |
| M5           | 54         | 11          | West Virginia | Cabell County      |
| M5           | 21         | 89          | Kentucky      | Greenup County     |
| M5           | 54         | 99          | West Virginia | Wayne County       |
| M6           | 36         | 1           | New York      | Albany County      |
| M6           | 36         | 3           | New York      | Allegany County    |
| M6           | 36         | 7           | New York      | Broome County      |
| M6           | 36         | 9           | New York      | Cattaraugus County |
| M6           | 36         | 11          | New York      | Cayuga County      |
| M6           | 36         | 13          | New York      | Chautauqua County  |
| M6           | 36         | 15          | New York      | Chemung County     |
| M6           | 36         | 17          | New York      | Chenango County    |
| M6           | 36         | 19          | New York      | Clinton County     |
| M6           | 36         | 21          | New York      | Columbia County    |
| M6           | 36         | 23          | New York      | Cortland County    |
| M6           | 36         | 25          | New York      | Delaware County    |
| M6           | 36         | 27          | New York      | Dutchess County    |
| M6           | 36         | 29          | New York      | Erie County        |
| M6           | 36         | 31          | New York      | Essex County       |
| M6           | 36         | 33          | New York      | Franklin County    |
| M6           | 36         | 35          | New York      | Fulton County      |
| M6           | 36         | 37          | New York      | Genesee County     |
| M6           | 36         | 39          | New York      | Greene County      |
| M6           | 36         | 41          | New York      | Hamilton County    |
| M6           | 36         | 43          | New York      | Herkimer County    |
| M6           | 36         | 45          | New York      | Jefferson County   |
| M6           | 36         | 49          | New York      | Lewis County       |
| M6           | 36         | 51          | New York      | Livingston County  |
| M6           | 36         | 53          | New York      | Madison County     |
| M6           | 36         | 55          | New York      | Monroe County      |
| M6           | 36         | 57          | New York      | Montgomery County  |
| M6           | 36         | 63          | New York      | Niagara County     |
| M6           | 36         | 65          | New York      | Oneida County      |

| Model Region | FIPS State | FIPS County | State        | County              |
|--------------|------------|-------------|--------------|---------------------|
| M6           | 36         | 67          | New York     | Onondaga County     |
| M6           | 36         | 69          | New York     | Ontario County      |
| M6           | 36         | 73          | New York     | Orleans County      |
| M6           | 36         | 75          | New York     | Oswego County       |
| M6           | 36         | 77          | New York     | Otsego County       |
| M6           | 36         | 83          | New York     | Rensselaer County   |
| M6           | 36         | 91          | New York     | Saratoga County     |
| M6           | 36         | 93          | New York     | Schenectady County  |
| M6           | 36         | 95          | New York     | Schoharie County    |
| M6           | 36         | 97          | New York     | Schuyler County     |
| M6           | 36         | 99          | New York     | Seneca County       |
| M6           | 36         | 89          | New York     | St. Lawrence County |
| M6           | 36         | 101         | New York     | Steuben County      |
| M6           | 36         | 105         | New York     | Sullivan County     |
| M6           | 36         | 107         | New York     | Tioga County        |
| M6           | 36         | 109         | New York     | Tompkins County     |
| M6           | 36         | 111         | New York     | Ulster County       |
| M6           | 36         | 113         | New York     | Warren County       |
| M6           | 36         | 115         | New York     | Washington County   |
| M6           | 36         | 117         | New York     | Wayne County        |
| M6           | 36         | 121         | New York     | Wyoming County      |
| M6           | 36         | 123         | New York     | Yates County        |
| M7           | 34         | 1           | New Jersey   | Atlantic County     |
| M7           | 34         | 9           | New Jersey   | Cape May County     |
| M7           | 34         | 41          | New Jersey   | Warren County       |
| M8           | 42         | 1           | Pennsylvania | Adams County        |
| M8           | 42         | 3           | Pennsylvania | Allegheny County    |
| M8           | 42         | 5           | Pennsylvania | Armstrong County    |
| M8           | 42         | 7           | Pennsylvania | Beaver County       |
| M8           | 42         | 9           | Pennsylvania | Bedford County      |
| M8           | 42         | 11          | Pennsylvania | Berks County        |
| M8           | 42         | 13          | Pennsylvania | Blair County        |
| M8           | 42         | 15          | Pennsylvania | Bradford County     |
| M8           | 42         | 19          | Pennsylvania | Butler County       |



Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State        | County            |
|--------------|------------|-------------|--------------|-------------------|
| M8           | 42         | 21          | Pennsylvania | Cambria County    |
| M8           | 42         | 23          | Pennsylvania | Cameron County    |
| M8           | 42         | 25          | Pennsylvania | Carbon County     |
| M8           | 42         | 27          | Pennsylvania | Centre County     |
| M8           | 42         | 31          | Pennsylvania | Clarion County    |
| M8           | 42         | 33          | Pennsylvania | Clearfield County |
| M8           | 42         | 35          | Pennsylvania | Clinton County    |
| M8           | 42         | 37          | Pennsylvania | Columbia County   |
| M8           | 42         | 39          | Pennsylvania | Crawford County   |
| M8           | 42         | 41          | Pennsylvania | Cumberland County |
| M8           | 42         | 43          | Pennsylvania | Dauphin County    |
| M8           | 42         | 47          | Pennsylvania | Elk County        |
| M8           | 42         | 49          | Pennsylvania | Erie County       |
| M8           | 42         | 51          | Pennsylvania | Fayette County    |
| M8           | 42         | 53          | Pennsylvania | Forest County     |
| M8           | 42         | 55          | Pennsylvania | Franklin County   |
| M8           | 42         | 57          | Pennsylvania | Fulton County     |
| M8           | 42         | 59          | Pennsylvania | Greene County     |
| M8           | 42         | 61          | Pennsylvania | Huntingdon County |
| M8           | 42         | 63          | Pennsylvania | Indiana County    |
| M8           | 42         | 65          | Pennsylvania | Jefferson County  |
| M8           | 42         | 67          | Pennsylvania | Juniata County    |
| M8           | 42         | 69          | Pennsylvania | Lackawanna County |
| M8           | 42         | 71          | Pennsylvania | Lancaster County  |
| M8           | 42         | 73          | Pennsylvania | Lawrence County   |
| M8           | 42         | 75          | Pennsylvania | Lebanon County    |
| M8           | 42         | 77          | Pennsylvania | Lehigh County     |
| M8           | 42         | 79          | Pennsylvania | Luzerne County    |
| M8           | 42         | 81          | Pennsylvania | Lycoming County   |
| M8           | 42         | 83          | Pennsylvania | Mc Kean County    |
| M8           | 42         | 85          | Pennsylvania | Mercer County     |
| M8           | 42         | 87          | Pennsylvania | Mifflin County    |
| M8           | 42         | 89          | Pennsylvania | Monroe County     |
| M8           | 42         | 93          | Pennsylvania | Montour County    |

| Model Region | FIPS State | FIPS County | State        | County                |
|--------------|------------|-------------|--------------|-----------------------|
| M8           | 42         | 95          | Pennsylvania | Northampton County    |
| M8           | 42         | 97          | Pennsylvania | Northumberland County |
| M8           | 42         | 99          | Pennsylvania | Perry County          |
| M8           | 42         | 103         | Pennsylvania | Pike County           |
| M8           | 42         | 105         | Pennsylvania | Potter County         |
| M8           | 42         | 107         | Pennsylvania | Schuylkill County     |
| M8           | 42         | 109         | Pennsylvania | Snyder County         |
| M8           | 42         | 111         | Pennsylvania | Somerset County       |
| M8           | 42         | 113         | Pennsylvania | Sullivan County       |
| M8           | 42         | 115         | Pennsylvania | Susquehanna County    |
| M8           | 42         | 117         | Pennsylvania | Tioga County          |
| M8           | 42         | 119         | Pennsylvania | Union County          |
| M8           | 42         | 121         | Pennsylvania | Venango County        |
| M8           | 42         | 123         | Pennsylvania | Warren County         |
| M8           | 42         | 125         | Pennsylvania | Washington County     |
| M8           | 42         | 127         | Pennsylvania | Wayne County          |
| M8           | 42         | 129         | Pennsylvania | Westmoreland County   |
| M8           | 42         | 131         | Pennsylvania | Wyoming County        |
| M8           | 42         | 133         | Pennsylvania | York County           |
| M9           | 10         | 5           | Delaware     | Sussex County         |
| M10          | 51         | 1           | Virginia     | Accomack County       |
| M10          | 51         | 3           | Virginia     | Albemarle County      |
| M10          | 51         | 5           | Virginia     | Alleghany County      |
| M10          | 51         | 7           | Virginia     | Amelia County         |
| M10          | 51         | 9           | Virginia     | Amherst County        |
| M10          | 51         | 11          | Virginia     | Appomattox County     |
| M10          | 51         | 15          | Virginia     | Augusta County        |
| M10          | 51         | 17          | Virginia     | Bath County           |
| M10          | 51         | 515         | Virginia     | Bedford               |
| M10          | 51         | 19          | Virginia     | Bedford County        |
| M10          | 51         | 21          | Virginia     | Bland County          |
| M10          | 51         | 23          | Virginia     | Botetourt County      |
| M10          | 51         | 520         | Virginia     | Bristol               |
| M10          | 51         | 25          | Virginia     | Brunswick County      |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County              |
|--------------|------------|-------------|----------|---------------------|
| M10          | 51         | 27          | Virginia | Buchanan County     |
| M10          | 51         | 29          | Virginia | Buckingham County   |
| M10          | 51         | 530         | Virginia | Buena Vista         |
| M10          | 51         | 31          | Virginia | Campbell County     |
| M10          | 51         | 33          | Virginia | Caroline County     |
| M10          | 51         | 35          | Virginia | Carroll County      |
| M10          | 51         | 36          | Virginia | Charles City County |
| M10          | 51         | 37          | Virginia | Charlotte County    |
| M10          | 51         | 540         | Virginia | Charlottesville     |
| M10          | 51         | 550         | Virginia | Chesapeake          |
| M10          | 51         | 41          | Virginia | Chesterfield County |
| M10          | 51         | 43          | Virginia | Clarke County       |
| M10          | 51         | 560         | Virginia | Clifton Forge       |
| M10          | 51         | 570         | Virginia | Colonial Heights    |
| M10          | 51         | 580         | Virginia | Covington           |
| M10          | 51         | 45          | Virginia | Craig County        |
| M10          | 51         | 47          | Virginia | Culpeper County     |
| M10          | 51         | 49          | Virginia | Cumberland County   |
| M10          | 51         | 590         | Virginia | Danville            |
| M10          | 51         | 51          | Virginia | Dickenson County    |
| M10          | 51         | 53          | Virginia | Dinwiddie County    |
| M10          | 51         | 595         | Virginia | Emporia             |
| M10          | 51         | 57          | Virginia | Essex County        |
| M10          | 51         | 61          | Virginia | Fauquier County     |
| M10          | 51         | 63          | Virginia | Floyd County        |
| M10          | 51         | 65          | Virginia | Fluvanna County     |
| M10          | 51         | 620         | Virginia | Franklin            |
| M10          | 51         | 67          | Virginia | Franklin County     |
| M10          | 51         | 69          | Virginia | Frederick County    |
| M10          | 51         | 630         | Virginia | Fredericksburg      |
| M10          | 51         | 640         | Virginia | Galax               |
| M10          | 51         | 71          | Virginia | Giles County        |
| M10          | 51         | 73          | Virginia | Gloucester County   |
| M10          | 51         | 75          | Virginia | Goochland County    |

| Model Region | FIPS State | FIPS County | State    | County                |
|--------------|------------|-------------|----------|-----------------------|
| M10          | 51         | 77          | Virginia | Grayson County        |
| M10          | 51         | 79          | Virginia | Greene County         |
| M10          | 51         | 81          | Virginia | Greensville County    |
| M10          | 51         | 83          | Virginia | Halifax County        |
| M10          | 51         | 650         | Virginia | Hampton               |
| M10          | 51         | 85          | Virginia | Hanover County        |
| M10          | 51         | 660         | Virginia | Harrisonburg          |
| M10          | 51         | 87          | Virginia | Henrico County        |
| M10          | 51         | 89          | Virginia | Henry County          |
| M10          | 51         | 91          | Virginia | Highland County       |
| M10          | 51         | 670         | Virginia | Hopewell              |
| M10          | 51         | 93          | Virginia | Isle Of Wight County  |
| M10          | 51         | 95          | Virginia | James City County     |
| M10          | 51         | 97          | Virginia | King And Queen County |
| M10          | 51         | 99          | Virginia | King George County    |
| M10          | 51         | 101         | Virginia | King William County   |
| M10          | 51         | 103         | Virginia | Lancaster County      |
| M10          | 51         | 105         | Virginia | Lee County            |
| M10          | 51         | 678         | Virginia | Lexington             |
| M10          | 51         | 109         | Virginia | Louisa County         |
| M10          | 51         | 111         | Virginia | Lunenburg County      |
| M10          | 51         | 680         | Virginia | Lynchburg             |
| M10          | 51         | 113         | Virginia | Madison County        |
| M10          | 51         | 690         | Virginia | Martinsville          |
| M10          | 51         | 115         | Virginia | Mathews County        |
| M10          | 51         | 117         | Virginia | Mecklenburg County    |
| M10          | 51         | 119         | Virginia | Middlesex County      |
| M10          | 51         | 121         | Virginia | Montgomery County     |
| M10          | 51         | 125         | Virginia | Nelson County         |
| M10          | 51         | 127         | Virginia | New Kent County       |
| M10          | 51         | 700         | Virginia | Newport News          |
| M10          | 51         | 710         | Virginia | Norfolk               |
| M10          | 51         | 131         | Virginia | Northampton County    |
| M10          | 51         | 133         | Virginia | Northumberland County |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County               |
|--------------|------------|-------------|----------|----------------------|
| M10          | 51         | 720         | Virginia | Norton               |
| M10          | 51         | 135         | Virginia | Nottoway County      |
| M10          | 51         | 137         | Virginia | Orange County        |
| M10          | 51         | 139         | Virginia | Page County          |
| M10          | 51         | 141         | Virginia | Patrick County       |
| M10          | 51         | 730         | Virginia | Petersburg           |
| M10          | 51         | 143         | Virginia | Pittsylvania County  |
| M10          | 51         | 735         | Virginia | Poquoson             |
| M10          | 51         | 740         | Virginia | Portsmouth           |
| M10          | 51         | 145         | Virginia | Powhatan County      |
| M10          | 51         | 147         | Virginia | Prince Edward County |
| M10          | 51         | 149         | Virginia | Prince George County |
| M10          | 51         | 155         | Virginia | Pulaski County       |
| M10          | 51         | 750         | Virginia | Radford              |
| M10          | 51         | 157         | Virginia | Rappahannock County  |
| M10          | 51         | 760         | Virginia | Richmond             |
| M10          | 51         | 159         | Virginia | Richmond County      |
| M10          | 51         | 770         | Virginia | Roanoke              |
| M10          | 51         | 161         | Virginia | Roanoke County       |
| M10          | 51         | 163         | Virginia | Rockbridge County    |
| M10          | 51         | 165         | Virginia | Rockingham County    |
| M10          | 51         | 167         | Virginia | Russell County       |
| M10          | 51         | 775         | Virginia | Salem                |
| M10          | 51         | 169         | Virginia | Scott County         |
| M10          | 51         | 171         | Virginia | Shenandoah County    |
| M10          | 51         | 173         | Virginia | Smyth County         |
| M10          | 51         | 780         | Virginia | South Boston         |
| M10          | 51         | 175         | Virginia | Southampton County   |
| M10          | 51         | 177         | Virginia | Spotsylvania County  |
| M10          | 51         | 790         | Virginia | Staunton             |
| M10          | 51         | 800         | Virginia | Suffolk              |
| M10          | 51         | 181         | Virginia | Surry County         |
| M10          | 51         | 183         | Virginia | Sussex County        |
| M10          | 51         | 185         | Virginia | Tazewell County      |

| Model Region | FIPS State | FIPS County | State         | County              |
|--------------|------------|-------------|---------------|---------------------|
| M10          | 51         | 810         | Virginia      | Virginia Beach      |
| M10          | 51         | 187         | Virginia      | Warren County       |
| M10          | 51         | 191         | Virginia      | Washington County   |
| M10          | 51         | 820         | Virginia      | Waynesboro          |
| M10          | 51         | 193         | Virginia      | Westmoreland County |
| M10          | 51         | 830         | Virginia      | Williamsburg        |
| M10          | 51         | 840         | Virginia      | Winchester          |
| M10          | 51         | 195         | Virginia      | Wise County         |
| M10          | 51         | 197         | Virginia      | Wythe County        |
| M10          | 51         | 199         | Virginia      | York County         |
| M11          | 54         | 1           | West Virginia | Barbour County      |
| M11          | 54         | 3           | West Virginia | Berkeley County     |
| M11          | 54         | 5           | West Virginia | Boone County        |
| M11          | 54         | 7           | West Virginia | Braxton County      |
| M11          | 54         | 9           | West Virginia | Brooke County       |
| M11          | 54         | 13          | West Virginia | Calhoun County      |
| M11          | 54         | 15          | West Virginia | Clay County         |
| M11          | 54         | 17          | West Virginia | Doddridge County    |
| M11          | 54         | 19          | West Virginia | Fayette County      |
| M11          | 54         | 21          | West Virginia | Gilmer County       |
| M11          | 54         | 23          | West Virginia | Grant County        |
| M11          | 54         | 25          | West Virginia | Greenbrier County   |
| M11          | 54         | 27          | West Virginia | Hampshire County    |
| M11          | 54         | 29          | West Virginia | Hancock County      |
| M11          | 54         | 31          | West Virginia | Hardy County        |
| M11          | 54         | 33          | West Virginia | Harrison County     |
| M11          | 54         | 35          | West Virginia | Jackson County      |
| M11          | 54         | 37          | West Virginia | Jefferson County    |
| M11          | 54         | 39          | West Virginia | Kanawha County      |
| M11          | 54         | 41          | West Virginia | Lewis County        |
| M11          | 54         | 43          | West Virginia | Lincoln County      |
| M11          | 54         | 45          | West Virginia | Logan County        |
| M11          | 54         | 49          | West Virginia | Marion County       |
| M11          | 54         | 51          | West Virginia | Marshall County     |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State         | County            |
|--------------|------------|-------------|---------------|-------------------|
| M11          | 54         | 53          | West Virginia | Mason County      |
| M11          | 54         | 47          | West Virginia | Mc Dowell County  |
| M11          | 54         | 55          | West Virginia | Mercer County     |
| M11          | 54         | 57          | West Virginia | Mineral County    |
| M11          | 54         | 59          | West Virginia | Mingo County      |
| M11          | 54         | 61          | West Virginia | Monongalia County |
| M11          | 54         | 63          | West Virginia | Monroe County     |
| M11          | 54         | 65          | West Virginia | Morgan County     |
| M11          | 54         | 67          | West Virginia | Nicholas County   |
| M11          | 54         | 69          | West Virginia | Ohio County       |
| M11          | 54         | 71          | West Virginia | Pendleton County  |
| M11          | 54         | 73          | West Virginia | Pleasants County  |
| M11          | 54         | 75          | West Virginia | Pocahontas County |
| M11          | 54         | 77          | West Virginia | Preston County    |
| M11          | 54         | 79          | West Virginia | Putnam County     |
| M11          | 54         | 81          | West Virginia | Raleigh County    |
| M11          | 54         | 83          | West Virginia | Randolph County   |
| M11          | 54         | 85          | West Virginia | Ritchie County    |
| M11          | 54         | 87          | West Virginia | Roane County      |
| M11          | 54         | 89          | West Virginia | Summers County    |
| M11          | 54         | 91          | West Virginia | Taylor County     |
| M11          | 54         | 93          | West Virginia | Tucker County     |
| M11          | 54         | 95          | West Virginia | Tyler County      |
| M11          | 54         | 97          | West Virginia | Upshur County     |
| M11          | 54         | 101         | West Virginia | Webster County    |
| M11          | 54         | 103         | West Virginia | Wetzel County     |
| M11          | 54         | 105         | West Virginia | Wirt County       |
| M11          | 54         | 107         | West Virginia | Wood County       |
| M11          | 54         | 109         | West Virginia | Wyoming County    |
| M12          | 24         | 1           | Maryland      | Allegany County   |
| M12          | 24         | 11          | Maryland      | Caroline County   |
| M12          | 24         | 19          | Maryland      | Dorchester County |
| M12          | 24         | 23          | Maryland      | Garrett County    |
| M12          | 24         | 29          | Maryland      | Kent County       |

| Model Region | FIPS State | FIPS County | State         | County              |
|--------------|------------|-------------|---------------|---------------------|
| M12          | 24         | 35          | Maryland      | Queen Annes County  |
| M12          | 24         | 39          | Maryland      | Somerset County     |
| M12          | 24         | 37          | Maryland      | St Marys County     |
| M12          | 24         | 41          | Maryland      | Talbot County       |
| M12          | 24         | 43          | Maryland      | Washington County   |
| M12          | 24         | 45          | Maryland      | Wicomico County     |
| M12          | 24         | 47          | Maryland      | Worcester County    |
| NE1          | 25         | 1           | Massachusetts | Barnstable County   |
| NE1          | 25         | 5           | Massachusetts | Bristol County      |
| NE1          | 25         | 7           | Massachusetts | Dukes County        |
| NE1          | 25         | 9           | Massachusetts | Essex County        |
| NE1          | 33         | 11          | New Hampshire | Hillsborough County |
| NE1          | 25         | 17          | Massachusetts | Middlesex County    |
| NE1          | 25         | 19          | Massachusetts | Nantucket County    |
| NE1          | 25         | 21          | Massachusetts | Norfolk County      |
| NE1          | 25         | 23          | Massachusetts | Plymouth County     |
| NE1          | 25         | 25          | Massachusetts | Suffolk County      |
| NE1          | 25         | 27          | Massachusetts | Worcester County    |
| NE2          | 9          | 3           | Connecticut   | Hartford County     |
| NE2          | 9          | 7           | Connecticut   | Middlesex County    |
| NE2          | 9          | 9           | Connecticut   | New Haven County    |
| NE2          | 9          | 11          | Connecticut   | New London County   |
| NE2          | 9          | 13          | Connecticut   | Tolland County      |
| NE2          | 9          | 15          | Connecticut   | Windham County      |
| NE3          | 33         | 15          | New Hampshire | Rockingham County   |
| NE3          | 33         | 17          | New Hampshire | Strafford County    |
| NE4          | 44         | 1           | Rhode Island  | Bristol County      |
| NE4          | 44         | 3           | Rhode Island  | Kent County         |
| NE4          | 44         | 5           | Rhode Island  | Newport County      |
| NE4          | 44         | 7           | Rhode Island  | Providence County   |
| NE4          | 44         | 9           | Rhode Island  | Washington County   |
| NE5          | 25         | 3           | Massachusetts | Berkshire County    |
| NE5          | 25         | 11          | Massachusetts | Franklin County     |
| NE5          | 25         | 13          | Massachusetts | Hampden County      |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State         | County              |
|--------------|------------|-------------|---------------|---------------------|
| NE5          | 25         | 15          | Massachusetts | Hampshire County    |
| NE6          | 33         | 1           | New Hampshire | Belknap County      |
| NE6          | 33         | 3           | New Hampshire | Carroll County      |
| NE6          | 33         | 5           | New Hampshire | Cheshire County     |
| NE6          | 33         | 7           | New Hampshire | Coos County         |
| NE6          | 33         | 9           | New Hampshire | Grafton County      |
| NE6          | 33         | 13          | New Hampshire | Merrimack County    |
| NE6          | 33         | 19          | New Hampshire | Sullivan County     |
| NE7          | 23         | 1           | Maine         | Androscoggin County |
| NE7          | 23         | 3           | Maine         | Aroostook County    |
| NE7          | 23         | 5           | Maine         | Cumberland County   |
| NE7          | 23         | 7           | Maine         | Franklin County     |
| NE7          | 23         | 9           | Maine         | Hancock County      |
| NE7          | 23         | 11          | Maine         | Kennebec County     |
| NE7          | 23         | 13          | Maine         | Knox County         |
| NE7          | 23         | 15          | Maine         | Lincoln County      |
| NE7          | 23         | 17          | Maine         | Oxford County       |
| NE7          | 23         | 19          | Maine         | Penobscot County    |
| NE7          | 23         | 21          | Maine         | Piscataquis County  |
| NE7          | 23         | 23          | Maine         | Sagadahoc County    |
| NE7          | 23         | 25          | Maine         | Somerset County     |
| NE7          | 23         | 27          | Maine         | Waldo County        |
| NE7          | 23         | 29          | Maine         | Washington County   |
| NE7          | 23         | 31          | Maine         | York County         |
| NE8          | 50         | 1           | Vermont       | Addison County      |
| NE8          | 50         | 3           | Vermont       | Bennington County   |
| NE8          | 50         | 5           | Vermont       | Caledonia County    |
| NE8          | 50         | 7           | Vermont       | Chittenden County   |
| NE8          | 50         | 9           | Vermont       | Essex County        |
| NE8          | 50         | 11          | Vermont       | Franklin County     |
| NE8          | 50         | 13          | Vermont       | Grand Isle County   |
| NE8          | 50         | 15          | Vermont       | Lamoille County     |
| NE8          | 50         | 17          | Vermont       | Orange County       |
| NE8          | 50         | 19          | Vermont       | Orleans County      |

| Model Region | FIPS State | FIPS County | State    | County                |
|--------------|------------|-------------|----------|-----------------------|
| NE8          | 50         | 21          | Vermont  | Rutland County        |
| NE8          | 50         | 23          | Vermont  | Washington County     |
| NE8          | 50         | 25          | Vermont  | Windham County        |
| NE8          | 50         | 27          | Vermont  | Windsor County        |
| PL1          | 29         | 1           | Missouri | Adair County          |
| PL1          | 29         | 3           | Missouri | Andrew County         |
| PL1          | 29         | 5           | Missouri | Atchison County       |
| PL1          | 29         | 7           | Missouri | Audrain County        |
| PL1          | 29         | 9           | Missouri | Barry County          |
| PL1          | 29         | 11          | Missouri | Barton County         |
| PL1          | 29         | 13          | Missouri | Bates County          |
| PL1          | 29         | 15          | Missouri | Benton County         |
| PL1          | 29         | 17          | Missouri | Bollinger County      |
| PL1          | 29         | 19          | Missouri | Boone County          |
| PL1          | 29         | 21          | Missouri | Buchanan County       |
| PL1          | 29         | 23          | Missouri | Butler County         |
| PL1          | 29         | 25          | Missouri | Caldwell County       |
| PL1          | 29         | 27          | Missouri | Callaway County       |
| PL1          | 29         | 29          | Missouri | Camden County         |
| PL1          | 29         | 31          | Missouri | Cape Girardeau County |
| PL1          | 29         | 33          | Missouri | Carroll County        |
| PL1          | 29         | 35          | Missouri | Carter County         |
| PL1          | 29         | 37          | Missouri | Cass County           |
| PL1          | 29         | 39          | Missouri | Cedar County          |
| PL1          | 29         | 41          | Missouri | Chariton County       |
| PL1          | 29         | 43          | Missouri | Christian County      |
| PL1          | 29         | 45          | Missouri | Clark County          |
| PL1          | 29         | 47          | Missouri | Clay County           |
| PL1          | 29         | 49          | Missouri | Clinton County        |
| PL1          | 29         | 51          | Missouri | Cole County           |
| PL1          | 29         | 53          | Missouri | Cooper County         |
| PL1          | 29         | 55          | Missouri | Crawford County       |
| PL1          | 29         | 57          | Missouri | Dade County           |
| PL1          | 29         | 59          | Missouri | Dallas County         |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| PL1          | 29         | 61          | Missouri | Daviess County    |
| PL1          | 29         | 63          | Missouri | De Kalb County    |
| PL1          | 29         | 65          | Missouri | Dent County       |
| PL1          | 29         | 67          | Missouri | Douglas County    |
| PL1          | 29         | 69          | Missouri | Dunklin County    |
| PL1          | 29         | 73          | Missouri | Gasconade County  |
| PL1          | 29         | 75          | Missouri | Gentry County     |
| PL1          | 29         | 77          | Missouri | Greene County     |
| PL1          | 29         | 79          | Missouri | Grundy County     |
| PL1          | 29         | 81          | Missouri | Harrison County   |
| PL1          | 29         | 83          | Missouri | Henry County      |
| PL1          | 29         | 85          | Missouri | Hickory County    |
| PL1          | 29         | 87          | Missouri | Holt County       |
| PL1          | 29         | 89          | Missouri | Howard County     |
| PL1          | 29         | 91          | Missouri | Howell County     |
| PL1          | 29         | 93          | Missouri | Iron County       |
| PL1          | 29         | 95          | Missouri | Jackson County    |
| PL1          | 29         | 97          | Missouri | Jasper County     |
| PL1          | 29         | 101         | Missouri | Johnson County    |
| PL1          | 29         | 103         | Missouri | Knox County       |
| PL1          | 29         | 105         | Missouri | Laclede County    |
| PL1          | 29         | 107         | Missouri | Lafayette County  |
| PL1          | 29         | 109         | Missouri | Lawrence County   |
| PL1          | 29         | 111         | Missouri | Lewis County      |
| PL1          | 29         | 113         | Missouri | Lincoln County    |
| PL1          | 29         | 115         | Missouri | Linn County       |
| PL1          | 29         | 117         | Missouri | Livingston County |
| PL1          | 29         | 121         | Missouri | Macon County      |
| PL1          | 29         | 123         | Missouri | Madison County    |
| PL1          | 29         | 125         | Missouri | Maries County     |
| PL1          | 29         | 127         | Missouri | Marion County     |
| PL1          | 29         | 119         | Missouri | Mc Donald County  |
| PL1          | 29         | 129         | Missouri | Mercer County     |
| PL1          | 29         | 131         | Missouri | Miller County     |

| Model Region | FIPS State | FIPS County | State    | County               |
|--------------|------------|-------------|----------|----------------------|
| PL1          | 29         | 133         | Missouri | Mississippi County   |
| PL1          | 29         | 135         | Missouri | Moniteau County      |
| PL1          | 29         | 137         | Missouri | Monroe County        |
| PL1          | 29         | 139         | Missouri | Montgomery County    |
| PL1          | 29         | 141         | Missouri | Morgan County        |
| PL1          | 29         | 143         | Missouri | New Madrid County    |
| PL1          | 29         | 145         | Missouri | Newton County        |
| PL1          | 29         | 147         | Missouri | Nodaway County       |
| PL1          | 29         | 149         | Missouri | Oregon County        |
| PL1          | 29         | 151         | Missouri | Osage County         |
| PL1          | 29         | 153         | Missouri | Ozark County         |
| PL1          | 29         | 155         | Missouri | Pemiscot County      |
| PL1          | 29         | 157         | Missouri | Perry County         |
| PL1          | 29         | 159         | Missouri | Pettis County        |
| PL1          | 29         | 161         | Missouri | Phelps County        |
| PL1          | 29         | 163         | Missouri | Pike County          |
| PL1          | 29         | 165         | Missouri | Platte County        |
| PL1          | 29         | 167         | Missouri | Polk County          |
| PL1          | 29         | 169         | Missouri | Pulaski County       |
| PL1          | 29         | 171         | Missouri | Putnam County        |
| PL1          | 29         | 173         | Missouri | Ralls County         |
| PL1          | 29         | 175         | Missouri | Randolph County      |
| PL1          | 29         | 177         | Missouri | Ray County           |
| PL1          | 29         | 179         | Missouri | Reynolds County      |
| PL1          | 29         | 181         | Missouri | Ripley County        |
| PL1          | 29         | 195         | Missouri | Saline County        |
| PL1          | 29         | 197         | Missouri | Schuyler County      |
| PL1          | 29         | 199         | Missouri | Scotland County      |
| PL1          | 29         | 201         | Missouri | Scott County         |
| PL1          | 29         | 203         | Missouri | Shannon County       |
| PL1          | 29         | 205         | Missouri | Shelby County        |
| PL1          | 29         | 185         | Missouri | St Clair County      |
| PL1          | 29         | 187         | Missouri | St Francois County   |
| PL1          | 29         | 186         | Missouri | Ste Genevieve County |

**Table A-1 (continued)**

| <b>Model Region</b> | <b>FIPS State</b> | <b>FIPS County</b> | <b>State</b> | <b>County</b>     |
|---------------------|-------------------|--------------------|--------------|-------------------|
| PL1                 | 29                | 207                | Missouri     | Stoddard County   |
| PL1                 | 29                | 209                | Missouri     | Stone County      |
| PL1                 | 29                | 211                | Missouri     | Sullivan County   |
| PL1                 | 29                | 213                | Missouri     | Taney County      |
| PL1                 | 29                | 215                | Missouri     | Texas County      |
| PL1                 | 29                | 217                | Missouri     | Vernon County     |
| PL1                 | 29                | 219                | Missouri     | Warren County     |
| PL1                 | 29                | 221                | Missouri     | Washington County |
| PL1                 | 29                | 223                | Missouri     | Wayne County      |
| PL1                 | 29                | 225                | Missouri     | Webster County    |
| PL1                 | 29                | 227                | Missouri     | Worth County      |
| PL1                 | 29                | 229                | Missouri     | Wright County     |
| PL2                 | 20                | 1                  | Kansas       | Allen County      |
| PL2                 | 20                | 3                  | Kansas       | Anderson County   |
| PL2                 | 20                | 5                  | Kansas       | Atchison County   |
| PL2                 | 20                | 7                  | Kansas       | Barber County     |
| PL2                 | 20                | 9                  | Kansas       | Barton County     |
| PL2                 | 20                | 11                 | Kansas       | Bourbon County    |
| PL2                 | 20                | 13                 | Kansas       | Brown County      |
| PL2                 | 20                | 15                 | Kansas       | Butler County     |
| PL2                 | 20                | 17                 | Kansas       | Chase County      |
| PL2                 | 20                | 19                 | Kansas       | Chautauqua County |
| PL2                 | 20                | 21                 | Kansas       | Cherokee County   |
| PL2                 | 20                | 23                 | Kansas       | Cheyenne County   |
| PL2                 | 20                | 25                 | Kansas       | Clark County      |
| PL2                 | 20                | 27                 | Kansas       | Clay County       |
| PL2                 | 20                | 29                 | Kansas       | Cloud County      |
| PL2                 | 20                | 31                 | Kansas       | Coffey County     |
| PL2                 | 20                | 33                 | Kansas       | Comanche County   |
| PL2                 | 20                | 35                 | Kansas       | Cowley County     |
| PL2                 | 20                | 37                 | Kansas       | Crawford County   |
| PL2                 | 20                | 39                 | Kansas       | Decatur County    |
| PL2                 | 20                | 41                 | Kansas       | Dickinson County  |
| PL2                 | 20                | 43                 | Kansas       | Doniphan County   |

| <b>Model Region</b> | <b>FIPS State</b> | <b>FIPS County</b> | <b>State</b> | <b>County</b>      |
|---------------------|-------------------|--------------------|--------------|--------------------|
| PL2                 | 20                | 45                 | Kansas       | Douglas County     |
| PL2                 | 20                | 47                 | Kansas       | Edwards County     |
| PL2                 | 20                | 49                 | Kansas       | Elk County         |
| PL2                 | 20                | 51                 | Kansas       | Ellis County       |
| PL2                 | 20                | 53                 | Kansas       | Ellsworth County   |
| PL2                 | 20                | 55                 | Kansas       | Finney County      |
| PL2                 | 20                | 57                 | Kansas       | Ford County        |
| PL2                 | 20                | 59                 | Kansas       | Franklin County    |
| PL2                 | 20                | 61                 | Kansas       | Geary County       |
| PL2                 | 20                | 63                 | Kansas       | Gove County        |
| PL2                 | 20                | 65                 | Kansas       | Graham County      |
| PL2                 | 20                | 67                 | Kansas       | Grant County       |
| PL2                 | 20                | 69                 | Kansas       | Gray County        |
| PL2                 | 20                | 71                 | Kansas       | Greeley County     |
| PL2                 | 20                | 73                 | Kansas       | Greenwood County   |
| PL2                 | 20                | 75                 | Kansas       | Hamilton County    |
| PL2                 | 20                | 77                 | Kansas       | Harper County      |
| PL2                 | 20                | 79                 | Kansas       | Harvey County      |
| PL2                 | 20                | 81                 | Kansas       | Haskell County     |
| PL2                 | 20                | 83                 | Kansas       | Hodgeman County    |
| PL2                 | 20                | 85                 | Kansas       | Jackson County     |
| PL2                 | 20                | 87                 | Kansas       | Jefferson County   |
| PL2                 | 20                | 89                 | Kansas       | Jewell County      |
| PL2                 | 20                | 91                 | Kansas       | Johnson County     |
| PL2                 | 20                | 93                 | Kansas       | Kearney County     |
| PL2                 | 20                | 95                 | Kansas       | Kingman County     |
| PL2                 | 20                | 97                 | Kansas       | Kiowa County       |
| PL2                 | 20                | 99                 | Kansas       | Labette County     |
| PL2                 | 20                | 101                | Kansas       | Lane County        |
| PL2                 | 20                | 103                | Kansas       | Leavenworth County |
| PL2                 | 20                | 105                | Kansas       | Lincoln County     |
| PL2                 | 20                | 107                | Kansas       | Linn County        |
| PL2                 | 20                | 109                | Kansas       | Logan County       |
| PL2                 | 20                | 111                | Kansas       | Lyon County        |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State  | County              |
|--------------|------------|-------------|--------|---------------------|
| PL2          | 20         | 115         | Kansas | Marion County       |
| PL2          | 20         | 117         | Kansas | Marshall County     |
| PL2          | 20         | 113         | Kansas | Mc Pherson County   |
| PL2          | 20         | 119         | Kansas | Meade County        |
| PL2          | 20         | 121         | Kansas | Miami County        |
| PL2          | 20         | 123         | Kansas | Mitchell County     |
| PL2          | 20         | 125         | Kansas | Montgomery County   |
| PL2          | 20         | 127         | Kansas | Morris County       |
| PL2          | 20         | 129         | Kansas | Morton County       |
| PL2          | 20         | 131         | Kansas | Nemaha County       |
| PL2          | 20         | 133         | Kansas | Neosho County       |
| PL2          | 20         | 135         | Kansas | Ness County         |
| PL2          | 20         | 137         | Kansas | Norton County       |
| PL2          | 20         | 139         | Kansas | Osage County        |
| PL2          | 20         | 141         | Kansas | Osborne County      |
| PL2          | 20         | 143         | Kansas | Ottawa County       |
| PL2          | 20         | 145         | Kansas | Pawnee County       |
| PL2          | 20         | 147         | Kansas | Phillips County     |
| PL2          | 20         | 149         | Kansas | Pottawatomie County |
| PL2          | 20         | 151         | Kansas | Pratt County        |
| PL2          | 20         | 153         | Kansas | Rawlins County      |
| PL2          | 20         | 155         | Kansas | Reno County         |
| PL2          | 20         | 157         | Kansas | Republic County     |
| PL2          | 20         | 159         | Kansas | Rice County         |
| PL2          | 20         | 161         | Kansas | Riley County        |
| PL2          | 20         | 163         | Kansas | Rooks County        |
| PL2          | 20         | 165         | Kansas | Rush County         |
| PL2          | 20         | 167         | Kansas | Russell County      |
| PL2          | 20         | 169         | Kansas | Saline County       |
| PL2          | 20         | 171         | Kansas | Scott County        |
| PL2          | 20         | 173         | Kansas | Sedgwick County     |
| PL2          | 20         | 175         | Kansas | Seward County       |
| PL2          | 20         | 177         | Kansas | Shawnee County      |
| PL2          | 20         | 179         | Kansas | Sheridan County     |

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| PL2          | 20         | 181         | Kansas   | Sherman County    |
| PL2          | 20         | 183         | Kansas   | Smith County      |
| PL2          | 20         | 185         | Kansas   | Stafford County   |
| PL2          | 20         | 187         | Kansas   | Stanton County    |
| PL2          | 20         | 189         | Kansas   | Stevens County    |
| PL2          | 20         | 191         | Kansas   | Sumner County     |
| PL2          | 20         | 193         | Kansas   | Thomas County     |
| PL2          | 20         | 195         | Kansas   | Trego County      |
| PL2          | 20         | 197         | Kansas   | Wabaunsee County  |
| PL2          | 20         | 199         | Kansas   | Wallace County    |
| PL2          | 20         | 201         | Kansas   | Washington County |
| PL2          | 20         | 203         | Kansas   | Wichita County    |
| PL2          | 20         | 205         | Kansas   | Wilson County     |
| PL2          | 20         | 207         | Kansas   | Woodson County    |
| PL2          | 20         | 209         | Kansas   | Wyandotte County  |
| PL3          | 31         | 1           | Nebraska | Adams County      |
| PL3          | 31         | 3           | Nebraska | Antelope County   |
| PL3          | 31         | 5           | Nebraska | Arthur County     |
| PL3          | 31         | 7           | Nebraska | Banner County     |
| PL3          | 31         | 9           | Nebraska | Blaine County     |
| PL3          | 31         | 11          | Nebraska | Boone County      |
| PL3          | 31         | 13          | Nebraska | Box Butte County  |
| PL3          | 31         | 15          | Nebraska | Boyd County       |
| PL3          | 31         | 17          | Nebraska | Brown County      |
| PL3          | 31         | 19          | Nebraska | Buffalo County    |
| PL3          | 31         | 21          | Nebraska | Burt County       |
| PL3          | 31         | 23          | Nebraska | Butler County     |
| PL3          | 31         | 25          | Nebraska | Cass County       |
| PL3          | 31         | 27          | Nebraska | Cedar County      |
| PL3          | 31         | 29          | Nebraska | Chase County      |
| PL3          | 31         | 31          | Nebraska | Cherry County     |
| PL3          | 31         | 33          | Nebraska | Cheyenne County   |
| PL3          | 31         | 35          | Nebraska | Clay County       |
| PL3          | 31         | 37          | Nebraska | Colfax County     |



Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County           |
|--------------|------------|-------------|----------|------------------|
| PL3          | 31         | 39          | Nebraska | Cuming County    |
| PL3          | 31         | 41          | Nebraska | Custer County    |
| PL3          | 31         | 43          | Nebraska | Dakota County    |
| PL3          | 31         | 45          | Nebraska | Dawes County     |
| PL3          | 31         | 47          | Nebraska | Dawson County    |
| PL3          | 31         | 49          | Nebraska | Deuel County     |
| PL3          | 31         | 51          | Nebraska | Dixon County     |
| PL3          | 31         | 53          | Nebraska | Dodge County     |
| PL3          | 31         | 55          | Nebraska | Douglas County   |
| PL3          | 31         | 57          | Nebraska | Dundy County     |
| PL3          | 31         | 59          | Nebraska | Fillmore County  |
| PL3          | 31         | 61          | Nebraska | Franklin County  |
| PL3          | 31         | 63          | Nebraska | Frontier County  |
| PL3          | 31         | 65          | Nebraska | Furnas County    |
| PL3          | 31         | 67          | Nebraska | Gage County      |
| PL3          | 31         | 69          | Nebraska | Garden County    |
| PL3          | 31         | 71          | Nebraska | Garfield County  |
| PL3          | 31         | 73          | Nebraska | Gosper County    |
| PL3          | 31         | 75          | Nebraska | Grant County     |
| PL3          | 31         | 77          | Nebraska | Greeley County   |
| PL3          | 31         | 79          | Nebraska | Hall County      |
| PL3          | 31         | 81          | Nebraska | Hamilton County  |
| PL3          | 31         | 83          | Nebraska | Harlan County    |
| PL3          | 31         | 85          | Nebraska | Hayes County     |
| PL3          | 31         | 87          | Nebraska | Hitchcock County |
| PL3          | 31         | 89          | Nebraska | Holt County      |
| PL3          | 31         | 91          | Nebraska | Hooker County    |
| PL3          | 31         | 93          | Nebraska | Howard County    |
| PL3          | 31         | 95          | Nebraska | Jefferson County |
| PL3          | 31         | 97          | Nebraska | Johnson County   |
| PL3          | 31         | 99          | Nebraska | Kearney County   |
| PL3          | 31         | 101         | Nebraska | Keith County     |
| PL3          | 31         | 103         | Nebraska | Keya Paha County |
| PL3          | 31         | 105         | Nebraska | Kimball County   |
| PL3          | 31         | 107         | Nebraska | Knox County      |

| Model Region | FIPS State | FIPS County | State    | County              |
|--------------|------------|-------------|----------|---------------------|
| PL3          | 31         | 109         | Nebraska | Lancaster County    |
| PL3          | 31         | 111         | Nebraska | Lincoln County      |
| PL3          | 31         | 113         | Nebraska | Logan County        |
| PL3          | 31         | 115         | Nebraska | Loup County         |
| PL3          | 31         | 119         | Nebraska | Madison County      |
| PL3          | 31         | 117         | Nebraska | Mc Pherson County   |
| PL3          | 31         | 121         | Nebraska | Merrick County      |
| PL3          | 31         | 123         | Nebraska | Morrill County      |
| PL3          | 31         | 125         | Nebraska | Nance County        |
| PL3          | 31         | 127         | Nebraska | Nemaha County       |
| PL3          | 31         | 129         | Nebraska | Nuckolls County     |
| PL3          | 31         | 131         | Nebraska | Otoe County         |
| PL3          | 31         | 133         | Nebraska | Pawnee County       |
| PL3          | 31         | 135         | Nebraska | Perkins County      |
| PL3          | 31         | 137         | Nebraska | Phelps County       |
| PL3          | 31         | 139         | Nebraska | Pierce County       |
| PL3          | 31         | 141         | Nebraska | Platte County       |
| PL3          | 31         | 143         | Nebraska | Polk County         |
| PL3          | 31         | 145         | Nebraska | Red Willow County   |
| PL3          | 31         | 147         | Nebraska | Richardson County   |
| PL3          | 31         | 149         | Nebraska | Rock County         |
| PL3          | 31         | 151         | Nebraska | Saline County       |
| PL3          | 31         | 153         | Nebraska | Sarpy County        |
| PL3          | 31         | 155         | Nebraska | Saunders County     |
| PL3          | 31         | 157         | Nebraska | Scotts Bluff County |
| PL3          | 31         | 159         | Nebraska | Seward County       |
| PL3          | 31         | 161         | Nebraska | Sheridan County     |
| PL3          | 31         | 163         | Nebraska | Sherman County      |
| PL3          | 31         | 165         | Nebraska | Sioux County        |
| PL3          | 31         | 167         | Nebraska | Stanton County      |
| PL3          | 31         | 169         | Nebraska | Thayer County       |
| PL3          | 31         | 171         | Nebraska | Thomas County       |
| PL3          | 31         | 173         | Nebraska | Thurston County     |
| PL3          | 31         | 175         | Nebraska | Valley County       |
| PL3          | 31         | 177         | Nebraska | Washington County   |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County             |
|--------------|------------|-------------|----------|--------------------|
| PL3          | 31         | 179         | Nebraska | Wayne County       |
| PL3          | 31         | 181         | Nebraska | Webster County     |
| PL3          | 31         | 183         | Nebraska | Wheeler County     |
| PL3          | 31         | 185         | Nebraska | York County        |
| PL4          | 19         | 1           | Iowa     | Adair County       |
| PL4          | 19         | 3           | Iowa     | Adams County       |
| PL4          | 19         | 5           | Iowa     | Allamakee County   |
| PL4          | 19         | 7           | Iowa     | Appanoose County   |
| PL4          | 19         | 9           | Iowa     | Audubon County     |
| PL4          | 19         | 11          | Iowa     | Benton County      |
| PL4          | 19         | 13          | Iowa     | Black Hawk County  |
| PL4          | 19         | 15          | Iowa     | Boone County       |
| PL4          | 19         | 17          | Iowa     | Bremer County      |
| PL4          | 19         | 19          | Iowa     | Buchanan County    |
| PL4          | 19         | 21          | Iowa     | Buena Vista County |
| PL4          | 19         | 23          | Iowa     | Butler County      |
| PL4          | 19         | 25          | Iowa     | Calhoun County     |
| PL4          | 19         | 27          | Iowa     | Carroll County     |
| PL4          | 19         | 29          | Iowa     | Cass County        |
| PL4          | 19         | 31          | Iowa     | Cedar County       |
| PL4          | 19         | 33          | Iowa     | Cerro Gordo County |
| PL4          | 19         | 35          | Iowa     | Cherokee County    |
| PL4          | 19         | 37          | Iowa     | Chickasaw County   |
| PL4          | 19         | 39          | Iowa     | Clarke County      |
| PL4          | 19         | 41          | Iowa     | Clay County        |
| PL4          | 19         | 43          | Iowa     | Clayton County     |
| PL4          | 19         | 45          | Iowa     | Clinton County     |
| PL4          | 19         | 47          | Iowa     | Crawford County    |
| PL4          | 19         | 49          | Iowa     | Dallas County      |
| PL4          | 19         | 51          | Iowa     | Davis County       |
| PL4          | 19         | 53          | Iowa     | Decatur County     |
| PL4          | 19         | 55          | Iowa     | Delaware County    |
| PL4          | 19         | 57          | Iowa     | Des Moines County  |
| PL4          | 19         | 59          | Iowa     | Dickinson County   |
| PL4          | 19         | 61          | Iowa     | Dubuque County     |

| Model Region | FIPS State | FIPS County | State | County           |
|--------------|------------|-------------|-------|------------------|
| PL4          | 19         | 63          | Iowa  | Emmet County     |
| PL4          | 19         | 65          | Iowa  | Fayette County   |
| PL4          | 19         | 67          | Iowa  | Floyd County     |
| PL4          | 19         | 69          | Iowa  | Franklin County  |
| PL4          | 19         | 71          | Iowa  | Fremont County   |
| PL4          | 19         | 73          | Iowa  | Greene County    |
| PL4          | 19         | 75          | Iowa  | Grundy County    |
| PL4          | 19         | 77          | Iowa  | Guthrie County   |
| PL4          | 19         | 79          | Iowa  | Hamilton County  |
| PL4          | 19         | 81          | Iowa  | Hancock County   |
| PL4          | 19         | 83          | Iowa  | Hardin County    |
| PL4          | 19         | 85          | Iowa  | Harrison County  |
| PL4          | 19         | 87          | Iowa  | Henry County     |
| PL4          | 19         | 89          | Iowa  | Howard County    |
| PL4          | 19         | 91          | Iowa  | Humboldt County  |
| PL4          | 19         | 93          | Iowa  | Ida County       |
| PL4          | 19         | 95          | Iowa  | Iowa County      |
| PL4          | 19         | 97          | Iowa  | Jackson County   |
| PL4          | 19         | 99          | Iowa  | Jasper County    |
| PL4          | 19         | 101         | Iowa  | Jefferson County |
| PL4          | 19         | 103         | Iowa  | Johnson County   |
| PL4          | 19         | 105         | Iowa  | Jones County     |
| PL4          | 19         | 107         | Iowa  | Keokuk County    |
| PL4          | 19         | 109         | Iowa  | Kossuth County   |
| PL4          | 19         | 111         | Iowa  | Lee County       |
| PL4          | 19         | 113         | Iowa  | Linn County      |
| PL4          | 19         | 115         | Iowa  | Louisa County    |
| PL4          | 19         | 117         | Iowa  | Lucas County     |
| PL4          | 19         | 119         | Iowa  | Lyon County      |
| PL4          | 19         | 121         | Iowa  | Madison County   |
| PL4          | 19         | 123         | Iowa  | Mahaska County   |
| PL4          | 19         | 125         | Iowa  | Marion County    |
| PL4          | 19         | 127         | Iowa  | Marshall County  |
| PL4          | 19         | 129         | Iowa  | Mills County     |
| PL4          | 19         | 131         | Iowa  | Mitchell County  |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County               |
|--------------|------------|-------------|----------|----------------------|
| PL4          | 19         | 133         | Iowa     | Monona County        |
| PL4          | 19         | 135         | Iowa     | Monroe County        |
| PL4          | 19         | 137         | Iowa     | Montgomery County    |
| PL4          | 19         | 139         | Iowa     | Muscatine County     |
| PL4          | 19         | 141         | Iowa     | O'Brien County       |
| PL4          | 19         | 143         | Iowa     | Osceola County       |
| PL4          | 19         | 145         | Iowa     | Page County          |
| PL4          | 19         | 147         | Iowa     | Palo Alto County     |
| PL4          | 19         | 149         | Iowa     | Plymouth County      |
| PL4          | 19         | 151         | Iowa     | Pocahontas County    |
| PL4          | 19         | 153         | Iowa     | Polk County          |
| PL4          | 19         | 155         | Iowa     | Pottawattamie County |
| PL4          | 19         | 157         | Iowa     | Poweshiek County     |
| PL4          | 19         | 159         | Iowa     | Ringgold County      |
| PL4          | 19         | 161         | Iowa     | Sac County           |
| PL4          | 19         | 163         | Iowa     | Scott County         |
| PL4          | 19         | 165         | Iowa     | Shelby County        |
| PL4          | 19         | 167         | Iowa     | Sioux County         |
| PL4          | 19         | 169         | Iowa     | Story County         |
| PL4          | 19         | 171         | Iowa     | Tama County          |
| PL4          | 19         | 173         | Iowa     | Taylor County        |
| PL4          | 19         | 175         | Iowa     | Union County         |
| PL4          | 19         | 177         | Iowa     | Van Buren County     |
| PL4          | 19         | 179         | Iowa     | Wapello County       |
| PL4          | 19         | 181         | Iowa     | Warren County        |
| PL4          | 19         | 183         | Iowa     | Washington County    |
| PL4          | 19         | 185         | Iowa     | Wayne County         |
| PL4          | 19         | 187         | Iowa     | Webster County       |
| PL4          | 19         | 189         | Iowa     | Winnebago County     |
| PL4          | 19         | 191         | Iowa     | Winneshiek County    |
| PL4          | 19         | 193         | Iowa     | Woodbury County      |
| PL4          | 19         | 195         | Iowa     | Worth County         |
| PL4          | 19         | 197         | Iowa     | Wright County        |
| R1           | 8          | 1           | Colorado | Adams County         |
| R1           | 8          | 3           | Colorado | Alamosa County       |

| Model Region | FIPS State | FIPS County | State    | County             |
|--------------|------------|-------------|----------|--------------------|
| R1           | 8          | 5           | Colorado | Arapahoe County    |
| R1           | 8          | 7           | Colorado | Archuleta County   |
| R1           | 8          | 9           | Colorado | Baca County        |
| R1           | 8          | 11          | Colorado | Bent County        |
| R1           | 8          | 13          | Colorado | Boulder County     |
| R1           | 8          | 15          | Colorado | Chaffee County     |
| R1           | 8          | 17          | Colorado | Cheyenne County    |
| R1           | 8          | 19          | Colorado | Clear Creek County |
| R1           | 8          | 21          | Colorado | Conejos County     |
| R1           | 8          | 23          | Colorado | Costilla County    |
| R1           | 8          | 25          | Colorado | Crowley County     |
| R1           | 8          | 27          | Colorado | Custer County      |
| R1           | 8          | 29          | Colorado | Delta County       |
| R1           | 8          | 31          | Colorado | Denver County      |
| R1           | 8          | 33          | Colorado | Dolores County     |
| R1           | 8          | 35          | Colorado | Douglas County     |
| R1           | 8          | 37          | Colorado | Eagle County       |
| R1           | 8          | 41          | Colorado | El Paso County     |
| R1           | 8          | 39          | Colorado | Elbert County      |
| R1           | 8          | 43          | Colorado | Fremont County     |
| R1           | 8          | 45          | Colorado | Garfield County    |
| R1           | 8          | 47          | Colorado | Gilpin County      |
| R1           | 8          | 49          | Colorado | Grand County       |
| R1           | 8          | 51          | Colorado | Gunnison County    |
| R1           | 8          | 53          | Colorado | Hinsdale County    |
| R1           | 8          | 55          | Colorado | Huerfano County    |
| R1           | 8          | 57          | Colorado | Jackson County     |
| R1           | 8          | 59          | Colorado | Jefferson County   |
| R1           | 8          | 61          | Colorado | Kiowa County       |
| R1           | 8          | 63          | Colorado | Kit Carson County  |
| R1           | 8          | 67          | Colorado | La Plata County    |
| R1           | 8          | 65          | Colorado | Lake County        |
| R1           | 8          | 69          | Colorado | Larimer County     |
| R1           | 8          | 71          | Colorado | Las Animas County  |
| R1           | 8          | 73          | Colorado | Lincoln County     |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| R1           | 8          | 75          | Colorado | Logan County      |
| R1           | 8          | 77          | Colorado | Mesa County       |
| R1           | 8          | 79          | Colorado | Mineral County    |
| R1           | 8          | 81          | Colorado | Moffat County     |
| R1           | 8          | 83          | Colorado | Montezuma County  |
| R1           | 8          | 85          | Colorado | Montrose County   |
| R1           | 8          | 87          | Colorado | Morgan County     |
| R1           | 8          | 89          | Colorado | Otero County      |
| R1           | 8          | 91          | Colorado | Ouray County      |
| R1           | 8          | 93          | Colorado | Park County       |
| R1           | 8          | 95          | Colorado | Phillips County   |
| R1           | 8          | 97          | Colorado | Pitkin County     |
| R1           | 8          | 99          | Colorado | Prowers County    |
| R1           | 8          | 101         | Colorado | Pueblo County     |
| R1           | 8          | 103         | Colorado | Rio Blanco County |
| R1           | 8          | 105         | Colorado | Rio Grande County |
| R1           | 8          | 107         | Colorado | Routt County      |
| R1           | 8          | 109         | Colorado | Saguache County   |
| R1           | 8          | 111         | Colorado | San Juan County   |
| R1           | 8          | 113         | Colorado | San Miguel County |
| R1           | 8          | 115         | Colorado | Sedgwick County   |
| R1           | 8          | 117         | Colorado | Summit County     |
| R1           | 8          | 119         | Colorado | Teller County     |
| R1           | 8          | 121         | Colorado | Washington County |
| R1           | 8          | 123         | Colorado | Weld County       |
| R1           | 8          | 125         | Colorado | Yuma County       |
| R2           | 49         | 1           | Utah     | Beaver County     |
| R2           | 49         | 3           | Utah     | Box Elder County  |
| R2           | 49         | 5           | Utah     | Cache County      |
| R2           | 49         | 7           | Utah     | Carbon County     |
| R2           | 49         | 9           | Utah     | Daggett County    |
| R2           | 49         | 11          | Utah     | Davis County      |
| R2           | 49         | 13          | Utah     | Duchesne County   |
| R2           | 49         | 15          | Utah     | Emery County      |
| R2           | 49         | 17          | Utah     | Garfield County   |

| Model Region | FIPS State | FIPS County | State   | County             |
|--------------|------------|-------------|---------|--------------------|
| R2           | 49         | 19          | Utah    | Grand County       |
| R2           | 49         | 21          | Utah    | Iron County        |
| R2           | 49         | 23          | Utah    | Juab County        |
| R2           | 49         | 25          | Utah    | Kane County        |
| R2           | 49         | 27          | Utah    | Millard County     |
| R2           | 49         | 29          | Utah    | Morgan County      |
| R2           | 49         | 31          | Utah    | Piute County       |
| R2           | 49         | 33          | Utah    | Rich County        |
| R2           | 49         | 35          | Utah    | Salt Lake County   |
| R2           | 49         | 37          | Utah    | San Juan County    |
| R2           | 49         | 39          | Utah    | Sanpete County     |
| R2           | 49         | 41          | Utah    | Sevier County      |
| R2           | 49         | 43          | Utah    | Summit County      |
| R2           | 49         | 45          | Utah    | Tooele County      |
| R2           | 49         | 47          | Utah    | Uintah County      |
| R2           | 49         | 49          | Utah    | Utah County        |
| R2           | 49         | 51          | Utah    | Wasatch County     |
| R2           | 49         | 53          | Utah    | Washington County  |
| R2           | 49         | 55          | Utah    | Wayne County       |
| R2           | 49         | 57          | Utah    | Weber County       |
| R3           | 56         | 1           | Wyoming | Albany County      |
| R3           | 56         | 3           | Wyoming | Big Horn County    |
| R3           | 56         | 5           | Wyoming | Campbell County    |
| R3           | 56         | 7           | Wyoming | Carbon County      |
| R3           | 56         | 9           | Wyoming | Converse County    |
| R3           | 56         | 11          | Wyoming | Crook County       |
| R3           | 56         | 13          | Wyoming | Fremont County     |
| R3           | 56         | 15          | Wyoming | Goshen County      |
| R3           | 56         | 17          | Wyoming | Hot Springs County |
| R3           | 56         | 19          | Wyoming | Johnson County     |
| R3           | 56         | 21          | Wyoming | Laramie County     |
| R3           | 56         | 23          | Wyoming | Lincoln County     |
| R3           | 56         | 25          | Wyoming | Natrona County     |
| R3           | 56         | 27          | Wyoming | Niobrara County    |
| R3           | 56         | 29          | Wyoming | Park County        |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State        | County               |
|--------------|------------|-------------|--------------|----------------------|
| R3           | 56         | 31          | Wyoming      | Platte County        |
| R3           | 56         | 33          | Wyoming      | Sheridan County      |
| R3           | 56         | 35          | Wyoming      | Sublette County      |
| R3           | 56         | 37          | Wyoming      | Sweetwater County    |
| R3           | 56         | 39          | Wyoming      | Teton County         |
| R3           | 56         | 41          | Wyoming      | Uinta County         |
| R3           | 56         | 43          | Wyoming      | Washakie County      |
| R3           | 56         | 45          | Wyoming      | Weston County        |
| R4           | 38         | 1           | North Dakota | Adams County         |
| R4           | 38         | 3           | North Dakota | Barnes County        |
| R4           | 38         | 5           | North Dakota | Benson County        |
| R4           | 38         | 7           | North Dakota | Billings County      |
| R4           | 38         | 9           | North Dakota | Bottineau County     |
| R4           | 38         | 11          | North Dakota | Bowman County        |
| R4           | 38         | 13          | North Dakota | Burke County         |
| R4           | 38         | 15          | North Dakota | Burleigh County      |
| R4           | 38         | 17          | North Dakota | Cass County          |
| R4           | 38         | 19          | North Dakota | Cavalier County      |
| R4           | 38         | 21          | North Dakota | Dickey County        |
| R4           | 38         | 23          | North Dakota | Divide County        |
| R4           | 38         | 25          | North Dakota | Dunn County          |
| R4           | 38         | 27          | North Dakota | Eddy County          |
| R4           | 38         | 29          | North Dakota | Emmons County        |
| R4           | 38         | 31          | North Dakota | Foster County        |
| R4           | 38         | 33          | North Dakota | Golden Valley County |
| R4           | 38         | 35          | North Dakota | Grand Forks County   |
| R4           | 38         | 37          | North Dakota | Grant County         |
| R4           | 38         | 39          | North Dakota | Griggs County        |
| R4           | 38         | 41          | North Dakota | Hettinger County     |
| R4           | 38         | 43          | North Dakota | Kidder County        |
| R4           | 38         | 45          | North Dakota | La Moure County      |
| R4           | 38         | 47          | North Dakota | Logan County         |
| R4           | 38         | 49          | North Dakota | Mc Henry County      |
| R4           | 38         | 51          | North Dakota | Mc Intosh County     |
| R4           | 38         | 53          | North Dakota | Mc Kenzie County     |

| Model Region | FIPS State | FIPS County | State        | County           |
|--------------|------------|-------------|--------------|------------------|
| R4           | 38         | 55          | North Dakota | Mc Lean County   |
| R4           | 38         | 57          | North Dakota | Mercer County    |
| R4           | 38         | 59          | North Dakota | Morton County    |
| R4           | 38         | 61          | North Dakota | Mountrail County |
| R4           | 38         | 63          | North Dakota | Nelson County    |
| R4           | 38         | 65          | North Dakota | Oliver County    |
| R4           | 38         | 67          | North Dakota | Pembina County   |
| R4           | 38         | 69          | North Dakota | Pierce County    |
| R4           | 38         | 71          | North Dakota | Ramsey County    |
| R4           | 38         | 73          | North Dakota | Ransom County    |
| R4           | 38         | 75          | North Dakota | Renville County  |
| R4           | 38         | 77          | North Dakota | Richland County  |
| R4           | 38         | 79          | North Dakota | Rolette County   |
| R4           | 38         | 81          | North Dakota | Sargent County   |
| R4           | 38         | 83          | North Dakota | Sheridan County  |
| R4           | 38         | 85          | North Dakota | Sioux County     |
| R4           | 38         | 87          | North Dakota | Slope County     |
| R4           | 38         | 89          | North Dakota | Stark County     |
| R4           | 38         | 91          | North Dakota | Steele County    |
| R4           | 38         | 93          | North Dakota | Stutsman County  |
| R4           | 38         | 95          | North Dakota | Towner County    |
| R4           | 38         | 97          | North Dakota | Traill County    |
| R4           | 38         | 99          | North Dakota | Walsh County     |
| R4           | 38         | 101         | North Dakota | Ward County      |
| R4           | 38         | 103         | North Dakota | Wells County     |
| R4           | 38         | 105         | North Dakota | Williams County  |
| R5           | 46         | 3           | South Dakota | Aurora County    |
| R5           | 46         | 5           | South Dakota | Beadle County    |
| R5           | 46         | 7           | South Dakota | Bennett County   |
| R5           | 46         | 9           | South Dakota | Bon Homme County |
| R5           | 46         | 11          | South Dakota | Brookings County |
| R5           | 46         | 13          | South Dakota | Brown County     |
| R5           | 46         | 15          | South Dakota | Brule County     |
| R5           | 46         | 17          | South Dakota | Buffalo County   |
| R5           | 46         | 19          | South Dakota | Butte County     |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State        | County             |
|--------------|------------|-------------|--------------|--------------------|
| R5           | 46         | 21          | South Dakota | Campbell County    |
| R5           | 46         | 23          | South Dakota | Charles Mix County |
| R5           | 46         | 25          | South Dakota | Clark County       |
| R5           | 46         | 27          | South Dakota | Clay County        |
| R5           | 46         | 29          | South Dakota | Codington County   |
| R5           | 46         | 31          | South Dakota | Corson County      |
| R5           | 46         | 33          | South Dakota | Custer County      |
| R5           | 46         | 35          | South Dakota | Davison County     |
| R5           | 46         | 37          | South Dakota | Day County         |
| R5           | 46         | 39          | South Dakota | Deuel County       |
| R5           | 46         | 41          | South Dakota | Dewey County       |
| R5           | 46         | 43          | South Dakota | Douglas County     |
| R5           | 46         | 45          | South Dakota | Edmunds County     |
| R5           | 46         | 47          | South Dakota | Fall River County  |
| R5           | 46         | 49          | South Dakota | Faulk County       |
| R5           | 46         | 51          | South Dakota | Grant County       |
| R5           | 46         | 53          | South Dakota | Gregory County     |
| R5           | 46         | 55          | South Dakota | Haakon County      |
| R5           | 46         | 57          | South Dakota | Hamlin County      |
| R5           | 46         | 59          | South Dakota | Hand County        |
| R5           | 46         | 61          | South Dakota | Hanson County      |
| R5           | 46         | 63          | South Dakota | Harding County     |
| R5           | 46         | 65          | South Dakota | Hughes County      |
| R5           | 46         | 67          | South Dakota | Hutchinson County  |
| R5           | 46         | 69          | South Dakota | Hyde County        |
| R5           | 46         | 71          | South Dakota | Jackson County     |
| R5           | 46         | 73          | South Dakota | Jerauld County     |
| R5           | 46         | 75          | South Dakota | Jones County       |
| R5           | 46         | 77          | South Dakota | Kingsbury County   |
| R5           | 46         | 79          | South Dakota | Lake County        |
| R5           | 46         | 81          | South Dakota | Lawrence County    |
| R5           | 46         | 83          | South Dakota | Lincoln County     |
| R5           | 46         | 85          | South Dakota | Lyman County       |
| R5           | 46         | 91          | South Dakota | Marshall County    |
| R5           | 46         | 87          | South Dakota | Mc Cook County     |

| Model Region | FIPS State | FIPS County | State        | County            |
|--------------|------------|-------------|--------------|-------------------|
| R5           | 46         | 89          | South Dakota | Mc Pherson County |
| R5           | 46         | 93          | South Dakota | Meade County      |
| R5           | 46         | 95          | South Dakota | Mellette County   |
| R5           | 46         | 97          | South Dakota | Miner County      |
| R5           | 46         | 99          | South Dakota | Minnehaha County  |
| R5           | 46         | 101         | South Dakota | Moody County      |
| R5           | 46         | 103         | South Dakota | Pennington County |
| R5           | 46         | 105         | South Dakota | Perkins County    |
| R5           | 46         | 107         | South Dakota | Potter County     |
| R5           | 46         | 109         | South Dakota | Roberts County    |
| R5           | 46         | 111         | South Dakota | Sanborn County    |
| R5           | 46         | 113         | South Dakota | Shannon County    |
| R5           | 46         | 115         | South Dakota | Spink County      |
| R5           | 46         | 117         | South Dakota | Stanley County    |
| R5           | 46         | 119         | South Dakota | Sully County      |
| R5           | 46         | 121         | South Dakota | Todd County       |
| R5           | 46         | 123         | South Dakota | Tripp County      |
| R5           | 46         | 125         | South Dakota | Turner County     |
| R5           | 46         | 127         | South Dakota | Union County      |
| R5           | 46         | 129         | South Dakota | Walworth County   |
| R5           | 46         | 135         | South Dakota | Yankton County    |
| R5           | 46         | 137         | South Dakota | Ziebach County    |
| R6           | 30         | 1           | Montana      | Beaverhead County |
| R6           | 30         | 3           | Montana      | Big Horn County   |
| R6           | 30         | 5           | Montana      | Blaine County     |
| R6           | 30         | 7           | Montana      | Broadwater County |
| R6           | 30         | 9           | Montana      | Carbon County     |
| R6           | 30         | 11          | Montana      | Carter County     |
| R6           | 30         | 13          | Montana      | Cascade County    |
| R6           | 30         | 15          | Montana      | Chouteau County   |
| R6           | 30         | 17          | Montana      | Custer County     |
| R6           | 30         | 19          | Montana      | Daniels County    |
| R6           | 30         | 21          | Montana      | Dawson County     |
| R6           | 30         | 23          | Montana      | Deer Lodge County |
| R6           | 30         | 25          | Montana      | Fallon County     |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State   | County                 |
|--------------|------------|-------------|---------|------------------------|
| R6           | 30         | 27          | Montana | Fergus County          |
| R6           | 30         | 29          | Montana | Flat Head County       |
| R6           | 30         | 31          | Montana | Gallatin County        |
| R6           | 30         | 33          | Montana | Garfield County        |
| R6           | 30         | 35          | Montana | Glacier County         |
| R6           | 30         | 37          | Montana | Golden Valley County   |
| R6           | 30         | 39          | Montana | Granite County         |
| R6           | 30         | 41          | Montana | Hill County            |
| R6           | 30         | 43          | Montana | Jefferson County       |
| R6           | 30         | 45          | Montana | Judith Basin County    |
| R6           | 30         | 47          | Montana | Lake County            |
| R6           | 30         | 49          | Montana | Lewis And Clark County |
| R6           | 30         | 51          | Montana | Liberty County         |
| R6           | 30         | 53          | Montana | Lincoln County         |
| R6           | 30         | 57          | Montana | Madison County         |
| R6           | 30         | 55          | Montana | Mc Cone County         |
| R6           | 30         | 59          | Montana | Meagher County         |
| R6           | 30         | 61          | Montana | Mineral County         |
| R6           | 30         | 63          | Montana | Missoula County        |
| R6           | 30         | 65          | Montana | Musselshell County     |
| R6           | 30         | 67          | Montana | Park County            |
| R6           | 30         | 69          | Montana | Petroleum County       |
| R6           | 30         | 71          | Montana | Phillips County        |
| R6           | 30         | 73          | Montana | Pondera County         |
| R6           | 30         | 75          | Montana | Powder River County    |
| R6           | 30         | 77          | Montana | Powell County          |
| R6           | 30         | 79          | Montana | Prairie County         |
| R6           | 30         | 81          | Montana | Ravalli County         |
| R6           | 30         | 83          | Montana | Richland County        |
| R6           | 30         | 85          | Montana | Roosevelt County       |
| R6           | 30         | 87          | Montana | Rosebud County         |
| R6           | 30         | 89          | Montana | Sanders County         |
| R6           | 30         | 91          | Montana | Sheridan County        |
| R6           | 30         | 93          | Montana | Silver Bow County      |
| R6           | 30         | 95          | Montana | Stillwater County      |

| Model Region | FIPS State | FIPS County | State   | County                |
|--------------|------------|-------------|---------|-----------------------|
| R6           | 30         | 97          | Montana | Sweet Grass County    |
| R6           | 30         | 99          | Montana | Teton County          |
| R6           | 30         | 101         | Montana | Toole County          |
| R6           | 30         | 103         | Montana | Treasure County       |
| R6           | 30         | 105         | Montana | Valley County         |
| R6           | 30         | 107         | Montana | Wheatland County      |
| R6           | 30         | 109         | Montana | Wibaux County         |
| R6           | 30         | 111         | Montana | Yellowstone County    |
| R6           | 30         | 113         | Montana | Yellowstone Pk County |
| R7           | 16         | 1           | Idaho   | Ada County            |
| R7           | 16         | 3           | Idaho   | Adams County          |
| R7           | 16         | 5           | Idaho   | Bannock County        |
| R7           | 16         | 7           | Idaho   | Bear Lake County      |
| R7           | 16         | 9           | Idaho   | Benewah County        |
| R7           | 16         | 11          | Idaho   | Bingham County        |
| R7           | 16         | 13          | Idaho   | Blaine County         |
| R7           | 16         | 15          | Idaho   | Boise County          |
| R7           | 16         | 17          | Idaho   | Bonner County         |
| R7           | 16         | 19          | Idaho   | Bonneville County     |
| R7           | 16         | 21          | Idaho   | Boundary County       |
| R7           | 16         | 23          | Idaho   | Butte County          |
| R7           | 16         | 25          | Idaho   | Camas County          |
| R7           | 16         | 27          | Idaho   | Canyon County         |
| R7           | 16         | 29          | Idaho   | Caribou County        |
| R7           | 16         | 31          | Idaho   | Cassia County         |
| R7           | 16         | 33          | Idaho   | Clark County          |
| R7           | 16         | 35          | Idaho   | Clearwater County     |
| R7           | 16         | 37          | Idaho   | Custer County         |
| R7           | 16         | 39          | Idaho   | Elmore County         |
| R7           | 16         | 41          | Idaho   | Franklin County       |
| R7           | 16         | 43          | Idaho   | Fremont County        |
| R7           | 16         | 45          | Idaho   | Gem County            |
| R7           | 16         | 47          | Idaho   | Gooding County        |
| R7           | 16         | 49          | Idaho   | Idaho County          |
| R7           | 16         | 51          | Idaho   | Jefferson County      |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State  | County            |
|--------------|------------|-------------|--------|-------------------|
| R7           | 16         | 53          | Idaho  | Jerome County     |
| R7           | 16         | 55          | Idaho  | Kootenai County   |
| R7           | 16         | 57          | Idaho  | Latah County      |
| R7           | 16         | 59          | Idaho  | Lemhi County      |
| R7           | 16         | 61          | Idaho  | Lewis County      |
| R7           | 16         | 63          | Idaho  | Lincoln County    |
| R7           | 16         | 65          | Idaho  | Madison County    |
| R7           | 16         | 67          | Idaho  | Minidoka County   |
| R7           | 16         | 69          | Idaho  | Nez perce County  |
| R7           | 16         | 71          | Idaho  | Oneida County     |
| R7           | 16         | 73          | Idaho  | Owyhee County     |
| R7           | 16         | 75          | Idaho  | Payette County    |
| R7           | 16         | 77          | Idaho  | Power County      |
| R7           | 16         | 79          | Idaho  | Shoshone County   |
| R7           | 16         | 81          | Idaho  | Teton County      |
| R7           | 16         | 83          | Idaho  | Twin Falls County |
| R7           | 16         | 85          | Idaho  | Valley County     |
| R7           | 16         | 87          | Idaho  | Washington County |
| R8           | 41         | 1           | Oregon | Baker County      |
| R8           | 41         | 3           | Oregon | Benton County     |
| R8           | 41         | 5           | Oregon | Clackamas County  |
| R8           | 41         | 7           | Oregon | Clatsop County    |
| R8           | 41         | 9           | Oregon | Columbia County   |
| R8           | 41         | 11          | Oregon | Coos County       |
| R8           | 41         | 13          | Oregon | Crook County      |
| R8           | 41         | 15          | Oregon | Curry County      |
| R8           | 41         | 17          | Oregon | Deschutes County  |
| R8           | 41         | 19          | Oregon | Douglas County    |
| R8           | 41         | 21          | Oregon | Gilliam County    |
| R8           | 41         | 23          | Oregon | Grant County      |
| R8           | 41         | 25          | Oregon | Harney County     |
| R8           | 41         | 27          | Oregon | Hood River County |
| R8           | 41         | 29          | Oregon | Jackson County    |
| R8           | 41         | 31          | Oregon | Jefferson County  |
| R8           | 41         | 33          | Oregon | Josephine County  |

| Model Region | FIPS State | FIPS County | State      | County              |
|--------------|------------|-------------|------------|---------------------|
| R8           | 41         | 35          | Oregon     | Klamath County      |
| R8           | 41         | 37          | Oregon     | Lake County         |
| R8           | 41         | 39          | Oregon     | Lane County         |
| R8           | 41         | 41          | Oregon     | Lincoln County      |
| R8           | 41         | 43          | Oregon     | Linn County         |
| R8           | 41         | 45          | Oregon     | Malheur County      |
| R8           | 41         | 47          | Oregon     | Marion County       |
| R8           | 41         | 49          | Oregon     | Morrow County       |
| R8           | 41         | 51          | Oregon     | Multnomah County    |
| R8           | 41         | 53          | Oregon     | Polk County         |
| R8           | 41         | 55          | Oregon     | Sherman County      |
| R8           | 41         | 57          | Oregon     | Tillamook County    |
| R8           | 41         | 59          | Oregon     | Umatilla County     |
| R8           | 41         | 61          | Oregon     | Union County        |
| R8           | 41         | 63          | Oregon     | Wallowa County      |
| R8           | 41         | 65          | Oregon     | Wasco County        |
| R8           | 41         | 67          | Oregon     | Washington County   |
| R8           | 41         | 69          | Oregon     | Wheeler County      |
| R8           | 41         | 71          | Oregon     | Yamhill County      |
| R9           | 53         | 1           | Washington | Adams County        |
| R9           | 53         | 3           | Washington | Asotin County       |
| R9           | 53         | 5           | Washington | Benton County       |
| R9           | 53         | 7           | Washington | Chelan County       |
| R9           | 53         | 9           | Washington | Clallam County      |
| R9           | 53         | 11          | Washington | Clark County        |
| R9           | 53         | 13          | Washington | Columbia County     |
| R9           | 53         | 15          | Washington | Cowlitz County      |
| R9           | 53         | 17          | Washington | Douglas County      |
| R9           | 53         | 19          | Washington | Ferry County        |
| R9           | 53         | 21          | Washington | Franklin County     |
| R9           | 53         | 23          | Washington | Garfield County     |
| R9           | 53         | 25          | Washington | Grant County        |
| R9           | 53         | 27          | Washington | Grays Harbor County |
| R9           | 53         | 29          | Washington | Island County       |
| R9           | 53         | 31          | Washington | Jefferson County    |



Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State      | County              |
|--------------|------------|-------------|------------|---------------------|
| R9           | 53         | 33          | Washington | King County         |
| R9           | 53         | 35          | Washington | Kitsap County       |
| R9           | 53         | 37          | Washington | Kittitas County     |
| R9           | 53         | 39          | Washington | Klickitat County    |
| R9           | 53         | 41          | Washington | Lewis County        |
| R9           | 53         | 43          | Washington | Lincoln County      |
| R9           | 53         | 45          | Washington | Mason County        |
| R9           | 53         | 47          | Washington | Okanogan County     |
| R9           | 53         | 49          | Washington | Pacific County      |
| R9           | 53         | 51          | Washington | Pend Oreille County |
| R9           | 53         | 53          | Washington | Pierce County       |
| R9           | 53         | 55          | Washington | San Juan County     |
| R9           | 53         | 57          | Washington | Skagit County       |
| R9           | 53         | 59          | Washington | Skamania County     |
| R9           | 53         | 61          | Washington | Snohomish County    |
| R9           | 53         | 63          | Washington | Spokane County      |
| R9           | 53         | 65          | Washington | Stevens County      |
| R9           | 53         | 67          | Washington | Thurston County     |
| R9           | 53         | 69          | Washington | Wahkiakum County    |
| R9           | 53         | 71          | Washington | Walla Walla County  |
| R9           | 53         | 73          | Washington | Whatcom County      |
| R9           | 53         | 75          | Washington | Whitman County      |
| R9           | 53         | 77          | Washington | Yakima County       |
| S1           | 13         | 57          | Georgia    | Cherokee County     |
| S1           | 13         | 63          | Georgia    | Clayton County      |
| S1           | 13         | 67          | Georgia    | Cobb County         |
| S1           | 13         | 77          | Georgia    | Coweta County       |
| S1           | 13         | 89          | Georgia    | De Kalb County      |
| S1           | 13         | 97          | Georgia    | Douglas County      |
| S1           | 13         | 113         | Georgia    | Fayette County      |
| S1           | 13         | 117         | Georgia    | Forsyth County      |
| S1           | 13         | 121         | Georgia    | Fulton County       |
| S1           | 13         | 135         | Georgia    | Gwinnett County     |
| S1           | 13         | 151         | Georgia    | Henry County        |
| S1           | 13         | 223         | Georgia    | Paulding County     |

| Model Region | FIPS State | FIPS County | State    | County              |
|--------------|------------|-------------|----------|---------------------|
| S1           | 13         | 247         | Georgia  | Rockdale County     |
| S2           | 21         | 29          | Kentucky | Bullitt County      |
| S2           | 18         | 19          | Indiana  | Clark County        |
| S2           | 18         | 43          | Indiana  | Floyd County        |
| S2           | 21         | 111         | Kentucky | Jefferson County    |
| S2           | 21         | 185         | Kentucky | Oldham County       |
| S3           | 21         | 1           | Kentucky | Adair County        |
| S3           | 21         | 3           | Kentucky | Allen County        |
| S3           | 21         | 5           | Kentucky | Anderson County     |
| S3           | 21         | 7           | Kentucky | Ballard County      |
| S3           | 21         | 9           | Kentucky | Barren County       |
| S3           | 21         | 11          | Kentucky | Bath County         |
| S3           | 21         | 13          | Kentucky | Bell County         |
| S3           | 21         | 17          | Kentucky | Bourbon County      |
| S3           | 21         | 21          | Kentucky | Boyle County        |
| S3           | 21         | 23          | Kentucky | Bracken County      |
| S3           | 21         | 25          | Kentucky | Breathitt County    |
| S3           | 21         | 27          | Kentucky | Breckinridge County |
| S3           | 21         | 31          | Kentucky | Butler County       |
| S3           | 21         | 33          | Kentucky | Caldwell County     |
| S3           | 21         | 35          | Kentucky | Calloway County     |
| S3           | 21         | 39          | Kentucky | Carlisle County     |
| S3           | 21         | 41          | Kentucky | Carroll County      |
| S3           | 21         | 43          | Kentucky | Carter County       |
| S3           | 21         | 45          | Kentucky | Casey County        |
| S3           | 21         | 47          | Kentucky | Christian County    |
| S3           | 21         | 49          | Kentucky | Clark County        |
| S3           | 21         | 51          | Kentucky | Clay County         |
| S3           | 21         | 53          | Kentucky | Clinton County      |
| S3           | 21         | 55          | Kentucky | Crittenden County   |
| S3           | 21         | 57          | Kentucky | Cumberland County   |
| S3           | 21         | 59          | Kentucky | Daviess County      |
| S3           | 21         | 61          | Kentucky | Edmonson County     |
| S3           | 21         | 63          | Kentucky | Elliott County      |
| S3           | 21         | 65          | Kentucky | Estill County       |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| S3           | 21         | 67          | Kentucky | Fayette County    |
| S3           | 21         | 69          | Kentucky | Fleming County    |
| S3           | 21         | 71          | Kentucky | Floyd County      |
| S3           | 21         | 73          | Kentucky | Franklin County   |
| S3           | 21         | 75          | Kentucky | Fulton County     |
| S3           | 21         | 77          | Kentucky | Gallatin County   |
| S3           | 21         | 79          | Kentucky | Garrard County    |
| S3           | 21         | 81          | Kentucky | Grant County      |
| S3           | 21         | 83          | Kentucky | Graves County     |
| S3           | 21         | 85          | Kentucky | Grayson County    |
| S3           | 21         | 87          | Kentucky | Green County      |
| S3           | 21         | 91          | Kentucky | Hancock County    |
| S3           | 21         | 93          | Kentucky | Hardin County     |
| S3           | 21         | 95          | Kentucky | Harlan County     |
| S3           | 21         | 97          | Kentucky | Harrison County   |
| S3           | 21         | 99          | Kentucky | Hart County       |
| S3           | 21         | 101         | Kentucky | Henderson County  |
| S3           | 21         | 103         | Kentucky | Henry County      |
| S3           | 21         | 105         | Kentucky | Hickman County    |
| S3           | 21         | 107         | Kentucky | Hopkins County    |
| S3           | 21         | 109         | Kentucky | Jackson County    |
| S3           | 21         | 113         | Kentucky | Jessamine County  |
| S3           | 21         | 115         | Kentucky | Johnson County    |
| S3           | 21         | 119         | Kentucky | Knott County      |
| S3           | 21         | 121         | Kentucky | Knox County       |
| S3           | 21         | 123         | Kentucky | Larue County      |
| S3           | 21         | 125         | Kentucky | Laurel County     |
| S3           | 21         | 127         | Kentucky | Lawrence County   |
| S3           | 21         | 129         | Kentucky | Lee County        |
| S3           | 21         | 131         | Kentucky | Leslie County     |
| S3           | 21         | 133         | Kentucky | Letcher County    |
| S3           | 21         | 135         | Kentucky | Lewis County      |
| S3           | 21         | 137         | Kentucky | Lincoln County    |
| S3           | 21         | 139         | Kentucky | Livingston County |
| S3           | 21         | 141         | Kentucky | Logan County      |

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| S3           | 21         | 143         | Kentucky | Lyon County       |
| S3           | 21         | 151         | Kentucky | Madison County    |
| S3           | 21         | 153         | Kentucky | Magoffin County   |
| S3           | 21         | 155         | Kentucky | Marion County     |
| S3           | 21         | 157         | Kentucky | Marshall County   |
| S3           | 21         | 159         | Kentucky | Martin County     |
| S3           | 21         | 161         | Kentucky | Mason County      |
| S3           | 21         | 145         | Kentucky | Mc Cracken County |
| S3           | 21         | 147         | Kentucky | Mc Creary County  |
| S3           | 21         | 149         | Kentucky | Mc Lean County    |
| S3           | 21         | 163         | Kentucky | Meade County      |
| S3           | 21         | 165         | Kentucky | Menifee County    |
| S3           | 21         | 167         | Kentucky | Mercer County     |
| S3           | 21         | 169         | Kentucky | Metcalfe County   |
| S3           | 21         | 171         | Kentucky | Monroe County     |
| S3           | 21         | 173         | Kentucky | Montgomery County |
| S3           | 21         | 175         | Kentucky | Morgan County     |
| S3           | 21         | 177         | Kentucky | Muhlenberg County |
| S3           | 21         | 179         | Kentucky | Nelson County     |
| S3           | 21         | 181         | Kentucky | Nicholas County   |
| S3           | 21         | 183         | Kentucky | Ohio County       |
| S3           | 21         | 187         | Kentucky | Owen County       |
| S3           | 21         | 189         | Kentucky | Owsley County     |
| S3           | 21         | 191         | Kentucky | Pendleton County  |
| S3           | 21         | 193         | Kentucky | Perry County      |
| S3           | 21         | 195         | Kentucky | Pike County       |
| S3           | 21         | 197         | Kentucky | Powell County     |
| S3           | 21         | 199         | Kentucky | Pulaski County    |
| S3           | 21         | 201         | Kentucky | Robertson County  |
| S3           | 21         | 203         | Kentucky | Rockcastle County |
| S3           | 21         | 205         | Kentucky | Rowan County      |
| S3           | 21         | 207         | Kentucky | Russell County    |
| S3           | 21         | 209         | Kentucky | Scott County      |
| S3           | 21         | 211         | Kentucky | Shelby County     |
| S3           | 21         | 213         | Kentucky | Simpson County    |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State    | County            |
|--------------|------------|-------------|----------|-------------------|
| S3           | 21         | 215         | Kentucky | Spencer County    |
| S3           | 21         | 217         | Kentucky | Taylor County     |
| S3           | 21         | 219         | Kentucky | Todd County       |
| S3           | 21         | 221         | Kentucky | Trigg County      |
| S3           | 21         | 223         | Kentucky | Trimble County    |
| S3           | 21         | 225         | Kentucky | Union County      |
| S3           | 21         | 227         | Kentucky | Warren County     |
| S3           | 21         | 229         | Kentucky | Washington County |
| S3           | 21         | 231         | Kentucky | Wayne County      |
| S3           | 21         | 233         | Kentucky | Webster County    |
| S3           | 21         | 235         | Kentucky | Whitley County    |
| S3           | 21         | 237         | Kentucky | Wolfe County      |
| S3           | 21         | 239         | Kentucky | Woodford County   |
| S4           | 13         | 1           | Georgia  | Appling County    |
| S4           | 13         | 3           | Georgia  | Atkinson County   |
| S4           | 13         | 5           | Georgia  | Bacon County      |
| S4           | 13         | 7           | Georgia  | Baker County      |
| S4           | 13         | 9           | Georgia  | Baldwin County    |
| S4           | 13         | 11          | Georgia  | Banks County      |
| S4           | 13         | 13          | Georgia  | Barrow County     |
| S4           | 13         | 15          | Georgia  | Bartow County     |
| S4           | 13         | 17          | Georgia  | Ben Hill County   |
| S4           | 13         | 19          | Georgia  | Berrien County    |
| S4           | 13         | 21          | Georgia  | Bibb County       |
| S4           | 13         | 23          | Georgia  | Bleckley County   |
| S4           | 13         | 25          | Georgia  | Brantley County   |
| S4           | 13         | 27          | Georgia  | Brooks County     |
| S4           | 13         | 29          | Georgia  | Bryan County      |
| S4           | 13         | 31          | Georgia  | Bulloch County    |
| S4           | 13         | 33          | Georgia  | Burke County      |
| S4           | 13         | 35          | Georgia  | Butts County      |
| S4           | 13         | 37          | Georgia  | Calhoun County    |
| S4           | 13         | 39          | Georgia  | Camden County     |
| S4           | 13         | 43          | Georgia  | Candler County    |
| S4           | 13         | 45          | Georgia  | Carroll County    |

| Model Region | FIPS State | FIPS County | State   | County               |
|--------------|------------|-------------|---------|----------------------|
| S4           | 13         | 47          | Georgia | Catoosa County       |
| S4           | 13         | 49          | Georgia | Charlton County      |
| S4           | 13         | 51          | Georgia | Chatham County       |
| S4           | 13         | 53          | Georgia | Chattahoochee County |
| S4           | 13         | 55          | Georgia | Chattooga County     |
| S4           | 13         | 59          | Georgia | Clarke County        |
| S4           | 13         | 61          | Georgia | Clay County          |
| S4           | 13         | 65          | Georgia | Clinch County        |
| S4           | 13         | 69          | Georgia | Coffee County        |
| S4           | 13         | 71          | Georgia | Colquitt County      |
| S4           | 13         | 73          | Georgia | Columbia County      |
| S4           | 13         | 75          | Georgia | Cook County          |
| S4           | 13         | 79          | Georgia | Crawford County      |
| S4           | 13         | 81          | Georgia | Crisp County         |
| S4           | 13         | 83          | Georgia | Dade County          |
| S4           | 13         | 85          | Georgia | Dawson County        |
| S4           | 13         | 87          | Georgia | Decatur County       |
| S4           | 13         | 91          | Georgia | Dodge County         |
| S4           | 13         | 93          | Georgia | Dooly County         |
| S4           | 13         | 95          | Georgia | Dougherty County     |
| S4           | 13         | 99          | Georgia | Early County         |
| S4           | 13         | 101         | Georgia | Echols County        |
| S4           | 13         | 103         | Georgia | Effingham County     |
| S4           | 13         | 105         | Georgia | Elbert County        |
| S4           | 13         | 107         | Georgia | Emanuel County       |
| S4           | 13         | 109         | Georgia | Evans County         |
| S4           | 13         | 111         | Georgia | Fannin County        |
| S4           | 13         | 115         | Georgia | Floyd County         |
| S4           | 13         | 119         | Georgia | Franklin County      |
| S4           | 13         | 123         | Georgia | Gilmer County        |
| S4           | 13         | 125         | Georgia | Glascock County      |
| S4           | 13         | 127         | Georgia | Glynn County         |
| S4           | 13         | 129         | Georgia | Gordon County        |
| S4           | 13         | 131         | Georgia | Grady County         |
| S4           | 13         | 133         | Georgia | Greene County        |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State   | County            |
|--------------|------------|-------------|---------|-------------------|
| S4           | 13         | 137         | Georgia | Habersham County  |
| S4           | 13         | 139         | Georgia | Hall County       |
| S4           | 13         | 141         | Georgia | Hancock County    |
| S4           | 13         | 143         | Georgia | Haralson County   |
| S4           | 13         | 145         | Georgia | Harris County     |
| S4           | 13         | 147         | Georgia | Hart County       |
| S4           | 13         | 149         | Georgia | Heard County      |
| S4           | 13         | 153         | Georgia | Houston County    |
| S4           | 13         | 155         | Georgia | Irwin County      |
| S4           | 13         | 157         | Georgia | Jackson County    |
| S4           | 13         | 159         | Georgia | Jasper County     |
| S4           | 13         | 161         | Georgia | Jeff Davis County |
| S4           | 13         | 163         | Georgia | Jefferson County  |
| S4           | 13         | 165         | Georgia | Jenkins County    |
| S4           | 13         | 167         | Georgia | Johnson County    |
| S4           | 13         | 169         | Georgia | Jones County      |
| S4           | 13         | 171         | Georgia | Lamar County      |
| S4           | 13         | 173         | Georgia | Lanier County     |
| S4           | 13         | 175         | Georgia | Laurens County    |
| S4           | 13         | 177         | Georgia | Lee County        |
| S4           | 13         | 179         | Georgia | Liberty County    |
| S4           | 13         | 181         | Georgia | Lincoln County    |
| S4           | 13         | 183         | Georgia | Long County       |
| S4           | 13         | 185         | Georgia | Lowndes County    |
| S4           | 13         | 187         | Georgia | Lumpkin County    |
| S4           | 13         | 193         | Georgia | Macon County      |
| S4           | 13         | 195         | Georgia | Madison County    |
| S4           | 13         | 197         | Georgia | Marion County     |
| S4           | 13         | 189         | Georgia | Mc Duffie County  |
| S4           | 13         | 191         | Georgia | Mc Intosh County  |
| S4           | 13         | 199         | Georgia | Meriwether County |
| S4           | 13         | 201         | Georgia | Miller County     |
| S4           | 13         | 205         | Georgia | Mitchell County   |
| S4           | 13         | 207         | Georgia | Monroe County     |
| S4           | 13         | 209         | Georgia | Montgomery County |

| Model Region | FIPS State | FIPS County | State   | County            |
|--------------|------------|-------------|---------|-------------------|
| S4           | 13         | 211         | Georgia | Morgan County     |
| S4           | 13         | 213         | Georgia | Murray County     |
| S4           | 13         | 215         | Georgia | Muscogee County   |
| S4           | 13         | 217         | Georgia | Newton County     |
| S4           | 13         | 219         | Georgia | Oconee County     |
| S4           | 13         | 221         | Georgia | Oglethorpe County |
| S4           | 13         | 225         | Georgia | Peach County      |
| S4           | 13         | 227         | Georgia | Pickens County    |
| S4           | 13         | 229         | Georgia | Pierce County     |
| S4           | 13         | 231         | Georgia | Pike County       |
| S4           | 13         | 233         | Georgia | Polk County       |
| S4           | 13         | 235         | Georgia | Pulaski County    |
| S4           | 13         | 237         | Georgia | Putnam County     |
| S4           | 13         | 239         | Georgia | Quitman County    |
| S4           | 13         | 241         | Georgia | Rabun County      |
| S4           | 13         | 243         | Georgia | Randolph County   |
| S4           | 13         | 245         | Georgia | Richmond County   |
| S4           | 13         | 249         | Georgia | Schley County     |
| S4           | 13         | 251         | Georgia | Screven County    |
| S4           | 13         | 253         | Georgia | Seminole County   |
| S4           | 13         | 255         | Georgia | Spalding County   |
| S4           | 13         | 257         | Georgia | Stephens County   |
| S4           | 13         | 259         | Georgia | Stewart County    |
| S4           | 13         | 261         | Georgia | Sumter County     |
| S4           | 13         | 263         | Georgia | Talbot County     |
| S4           | 13         | 265         | Georgia | Taliaferro County |
| S4           | 13         | 267         | Georgia | Tattnall County   |
| S4           | 13         | 269         | Georgia | Taylor County     |
| S4           | 13         | 271         | Georgia | Telfair County    |
| S4           | 13         | 273         | Georgia | Terrell County    |
| S4           | 13         | 275         | Georgia | Thomas County     |
| S4           | 13         | 277         | Georgia | Tift County       |
| S4           | 13         | 279         | Georgia | Toombs County     |
| S4           | 13         | 281         | Georgia | Towns County      |
| S4           | 13         | 283         | Georgia | Treutlen County   |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State     | County            |
|--------------|------------|-------------|-----------|-------------------|
| S4           | 13         | 285         | Georgia   | Troup County      |
| S4           | 13         | 287         | Georgia   | Turner County     |
| S4           | 13         | 289         | Georgia   | Twiggs County     |
| S4           | 13         | 291         | Georgia   | Union County      |
| S4           | 13         | 293         | Georgia   | Upson County      |
| S4           | 13         | 295         | Georgia   | Walker County     |
| S4           | 13         | 297         | Georgia   | Walton County     |
| S4           | 13         | 299         | Georgia   | Ware County       |
| S4           | 13         | 301         | Georgia   | Warren County     |
| S4           | 13         | 303         | Georgia   | Washington County |
| S4           | 13         | 305         | Georgia   | Wayne County      |
| S4           | 13         | 307         | Georgia   | Webster County    |
| S4           | 13         | 309         | Georgia   | Wheeler County    |
| S4           | 13         | 311         | Georgia   | White County      |
| S4           | 13         | 313         | Georgia   | Whitfield County  |
| S4           | 13         | 315         | Georgia   | Wilcox County     |
| S4           | 13         | 317         | Georgia   | Wilkes County     |
| S4           | 13         | 319         | Georgia   | Wilkinson County  |
| S4           | 13         | 321         | Georgia   | Worth County      |
| S5           | 47         | 1           | Tennessee | Anderson County   |
| S5           | 47         | 3           | Tennessee | Bedford County    |
| S5           | 47         | 5           | Tennessee | Benton County     |
| S5           | 47         | 7           | Tennessee | Bledsoe County    |
| S5           | 47         | 9           | Tennessee | Blount County     |
| S5           | 47         | 11          | Tennessee | Bradley County    |
| S5           | 47         | 13          | Tennessee | Campbell County   |
| S5           | 47         | 15          | Tennessee | Cannon County     |
| S5           | 47         | 17          | Tennessee | Carroll County    |
| S5           | 47         | 19          | Tennessee | Carter County     |
| S5           | 47         | 21          | Tennessee | Cheatham County   |
| S5           | 47         | 23          | Tennessee | Chester County    |
| S5           | 47         | 25          | Tennessee | Claiborne County  |
| S5           | 47         | 27          | Tennessee | Clay County       |
| S5           | 47         | 29          | Tennessee | Cocke County      |
| S5           | 47         | 31          | Tennessee | Coffee County     |

| Model Region | FIPS State | FIPS County | State     | County            |
|--------------|------------|-------------|-----------|-------------------|
| S5           | 47         | 33          | Tennessee | Crockett County   |
| S5           | 47         | 35          | Tennessee | Cumberland County |
| S5           | 47         | 37          | Tennessee | Davidson County   |
| S5           | 47         | 41          | Tennessee | De Kalb County    |
| S5           | 47         | 39          | Tennessee | Decatur County    |
| S5           | 47         | 43          | Tennessee | Dickson County    |
| S5           | 47         | 45          | Tennessee | Dyer County       |
| S5           | 47         | 47          | Tennessee | Fayette County    |
| S5           | 47         | 49          | Tennessee | Fentress County   |
| S5           | 47         | 51          | Tennessee | Franklin County   |
| S5           | 47         | 53          | Tennessee | Gibson County     |
| S5           | 47         | 55          | Tennessee | Giles County      |
| S5           | 47         | 57          | Tennessee | Grainger County   |
| S5           | 47         | 59          | Tennessee | Greene County     |
| S5           | 47         | 61          | Tennessee | Grundy County     |
| S5           | 47         | 63          | Tennessee | Hamblen County    |
| S5           | 47         | 65          | Tennessee | Hamilton County   |
| S5           | 47         | 67          | Tennessee | Hancock County    |
| S5           | 47         | 69          | Tennessee | Hardeman County   |
| S5           | 47         | 71          | Tennessee | Hardin County     |
| S5           | 47         | 73          | Tennessee | Hawkins County    |
| S5           | 47         | 75          | Tennessee | Haywood County    |
| S5           | 47         | 77          | Tennessee | Henderson County  |
| S5           | 47         | 79          | Tennessee | Henry County      |
| S5           | 47         | 81          | Tennessee | Hickman County    |
| S5           | 47         | 83          | Tennessee | Houston County    |
| S5           | 47         | 85          | Tennessee | Humphreys County  |
| S5           | 47         | 87          | Tennessee | Jackson County    |
| S5           | 47         | 89          | Tennessee | Jefferson County  |
| S5           | 47         | 91          | Tennessee | Johnson County    |
| S5           | 47         | 93          | Tennessee | Knox County       |
| S5           | 47         | 95          | Tennessee | Lake County       |
| S5           | 47         | 97          | Tennessee | Lauderdale County |
| S5           | 47         | 99          | Tennessee | Lawrence County   |
| S5           | 47         | 101         | Tennessee | Lewis County      |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State     | County            |
|--------------|------------|-------------|-----------|-------------------|
| S5           | 47         | 103         | Tennessee | Lincoln County    |
| S5           | 47         | 105         | Tennessee | Loudon County     |
| S5           | 47         | 111         | Tennessee | Macon County      |
| S5           | 47         | 113         | Tennessee | Madison County    |
| S5           | 47         | 115         | Tennessee | Marion County     |
| S5           | 47         | 117         | Tennessee | Marshall County   |
| S5           | 47         | 119         | Tennessee | Maury County      |
| S5           | 47         | 107         | Tennessee | Mc Minn County    |
| S5           | 47         | 109         | Tennessee | Mc Nairy County   |
| S5           | 47         | 121         | Tennessee | Meigs County      |
| S5           | 47         | 123         | Tennessee | Monroe County     |
| S5           | 47         | 125         | Tennessee | Montgomery County |
| S5           | 47         | 127         | Tennessee | Moore County      |
| S5           | 47         | 129         | Tennessee | Morgan County     |
| S5           | 47         | 131         | Tennessee | Obion County      |
| S5           | 47         | 133         | Tennessee | Overton County    |
| S5           | 47         | 135         | Tennessee | Perry County      |
| S5           | 47         | 137         | Tennessee | Pickett County    |
| S5           | 47         | 139         | Tennessee | Polk County       |
| S5           | 47         | 141         | Tennessee | Putnam County     |
| S5           | 47         | 143         | Tennessee | Rhea County       |
| S5           | 47         | 145         | Tennessee | Roane County      |
| S5           | 47         | 147         | Tennessee | Robertson County  |
| S5           | 47         | 149         | Tennessee | Rutherford County |
| S5           | 47         | 151         | Tennessee | Scott County      |
| S5           | 47         | 153         | Tennessee | Sequatchie County |
| S5           | 47         | 155         | Tennessee | Sevier County     |
| S5           | 47         | 157         | Tennessee | Shelby County     |
| S5           | 47         | 159         | Tennessee | Smith County      |
| S5           | 47         | 161         | Tennessee | Stewart County    |
| S5           | 47         | 163         | Tennessee | Sullivan County   |
| S5           | 47         | 165         | Tennessee | Sumner County     |
| S5           | 47         | 167         | Tennessee | Tipton County     |
| S5           | 47         | 169         | Tennessee | Trousdale County  |
| S5           | 47         | 171         | Tennessee | Unicoi County     |

| Model Region | FIPS State | FIPS County | State          | County            |
|--------------|------------|-------------|----------------|-------------------|
| S5           | 47         | 173         | Tennessee      | Union County      |
| S5           | 47         | 175         | Tennessee      | Van Buren County  |
| S5           | 47         | 177         | Tennessee      | Warren County     |
| S5           | 47         | 179         | Tennessee      | Washington County |
| S5           | 47         | 181         | Tennessee      | Wayne County      |
| S5           | 47         | 183         | Tennessee      | Weakley County    |
| S5           | 47         | 185         | Tennessee      | White County      |
| S5           | 47         | 187         | Tennessee      | Williamson County |
| S5           | 47         | 189         | Tennessee      | Wilson County     |
| S6           | 37         | 3           | North Carolina | Alexander County  |
| S6           | 37         | 5           | North Carolina | Alleghany County  |
| S6           | 37         | 7           | North Carolina | Anson County      |
| S6           | 37         | 9           | North Carolina | Ashe County       |
| S6           | 37         | 11          | North Carolina | Avery County      |
| S6           | 37         | 13          | North Carolina | Beaufort County   |
| S6           | 37         | 15          | North Carolina | Bertie County     |
| S6           | 37         | 17          | North Carolina | Bladen County     |
| S6           | 37         | 19          | North Carolina | Brunswick County  |
| S6           | 37         | 21          | North Carolina | Buncombe County   |
| S6           | 37         | 23          | North Carolina | Burke County      |
| S6           | 37         | 27          | North Carolina | Caldwell County   |
| S6           | 37         | 29          | North Carolina | Camden County     |
| S6           | 37         | 31          | North Carolina | Carteret County   |
| S6           | 37         | 33          | North Carolina | Caswell County    |
| S6           | 37         | 35          | North Carolina | Catawba County    |
| S6           | 37         | 39          | North Carolina | Cherokee County   |
| S6           | 37         | 41          | North Carolina | Chowan County     |
| S6           | 37         | 43          | North Carolina | Clay County       |
| S6           | 37         | 45          | North Carolina | Cleveland County  |
| S6           | 37         | 47          | North Carolina | Columbus County   |
| S6           | 37         | 49          | North Carolina | Craven County     |
| S6           | 37         | 51          | North Carolina | Cumberland County |
| S6           | 37         | 53          | North Carolina | Currituck County  |
| S6           | 37         | 55          | North Carolina | Dare County       |
| S6           | 37         | 61          | North Carolina | Duplin County     |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State          | County             |
|--------------|------------|-------------|----------------|--------------------|
| S6           | 37         | 65          | North Carolina | Edgecombe County   |
| S6           | 37         | 73          | North Carolina | Gates County       |
| S6           | 37         | 75          | North Carolina | Graham County      |
| S6           | 37         | 77          | North Carolina | Granville County   |
| S6           | 37         | 79          | North Carolina | Greene County      |
| S6           | 37         | 83          | North Carolina | Halifax County     |
| S6           | 37         | 85          | North Carolina | Harnett County     |
| S6           | 37         | 87          | North Carolina | Haywood County     |
| S6           | 37         | 89          | North Carolina | Henderson County   |
| S6           | 37         | 91          | North Carolina | Hertford County    |
| S6           | 37         | 93          | North Carolina | Hoke County        |
| S6           | 37         | 95          | North Carolina | Hyde County        |
| S6           | 37         | 99          | North Carolina | Jackson County     |
| S6           | 37         | 103         | North Carolina | Jones County       |
| S6           | 37         | 105         | North Carolina | Lee County         |
| S6           | 37         | 107         | North Carolina | Lenoir County      |
| S6           | 37         | 113         | North Carolina | Macon County       |
| S6           | 37         | 115         | North Carolina | Madison County     |
| S6           | 37         | 117         | North Carolina | Martin County      |
| S6           | 37         | 111         | North Carolina | Mc Dowell County   |
| S6           | 37         | 121         | North Carolina | Mitchell County    |
| S6           | 37         | 123         | North Carolina | Montgomery County  |
| S6           | 37         | 125         | North Carolina | Moore County       |
| S6           | 37         | 127         | North Carolina | Nash County        |
| S6           | 37         | 129         | North Carolina | New Hanover County |
| S6           | 37         | 131         | North Carolina | Northampton County |
| S6           | 37         | 133         | North Carolina | Onslow County      |
| S6           | 37         | 137         | North Carolina | Pamlico County     |
| S6           | 37         | 139         | North Carolina | Pasquotank County  |
| S6           | 37         | 141         | North Carolina | Pender County      |
| S6           | 37         | 143         | North Carolina | Perquimans County  |
| S6           | 37         | 145         | North Carolina | Person County      |
| S6           | 37         | 147         | North Carolina | Pitt County        |
| S6           | 37         | 149         | North Carolina | Polk County        |
| S6           | 37         | 153         | North Carolina | Richmond County    |

| Model Region | FIPS State | FIPS County | State          | County              |
|--------------|------------|-------------|----------------|---------------------|
| S6           | 37         | 155         | North Carolina | Robeson County      |
| S6           | 37         | 157         | North Carolina | Rockingham County   |
| S6           | 37         | 161         | North Carolina | Rutherford County   |
| S6           | 37         | 163         | North Carolina | Sampson County      |
| S6           | 37         | 165         | North Carolina | Scotland County     |
| S6           | 37         | 167         | North Carolina | Stanly County       |
| S6           | 37         | 171         | North Carolina | Surry County        |
| S6           | 37         | 173         | North Carolina | Swain County        |
| S6           | 37         | 175         | North Carolina | Transylvania County |
| S6           | 37         | 177         | North Carolina | Tyrrell County      |
| S6           | 37         | 181         | North Carolina | Vance County        |
| S6           | 37         | 185         | North Carolina | Warren County       |
| S6           | 37         | 187         | North Carolina | Washington County   |
| S6           | 37         | 189         | North Carolina | Watauga County      |
| S6           | 37         | 191         | North Carolina | Wayne County        |
| S6           | 37         | 193         | North Carolina | Wilkes County       |
| S6           | 37         | 195         | North Carolina | Wilson County       |
| S6           | 37         | 199         | North Carolina | Yancey County       |
| S7           | 37         | 37          | North Carolina | Chatham County      |
| S7           | 37         | 63          | North Carolina | Durham County       |
| S7           | 37         | 69          | North Carolina | Franklin County     |
| S7           | 37         | 101         | North Carolina | Johnston County     |
| S7           | 37         | 135         | North Carolina | Orange County       |
| S7           | 37         | 183         | North Carolina | Wake County         |
| S8           | 37         | 25          | North Carolina | Cabarrus County     |
| S8           | 37         | 71          | North Carolina | Gaston County       |
| S8           | 37         | 97          | North Carolina | Iredell County      |
| S8           | 37         | 109         | North Carolina | Lincoln County      |
| S8           | 37         | 119         | North Carolina | Mecklenburg County  |
| S8           | 37         | 159         | North Carolina | Rowan County        |
| S8           | 37         | 179         | North Carolina | Union County        |
| S8           | 45         | 91          | South Carolina | York County         |
| S9           | 37         | 1           | North Carolina | Alamance County     |
| S9           | 37         | 57          | North Carolina | Davidson County     |
| S9           | 37         | 59          | North Carolina | Davie County        |

Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State          | County           |
|--------------|------------|-------------|----------------|------------------|
| S9           | 37         | 67          | North Carolina | Forsyth County   |
| S9           | 37         | 81          | North Carolina | Guilford County  |
| S9           | 37         | 151         | North Carolina | Randolph County  |
| S9           | 37         | 169         | North Carolina | Stokes County    |
| S9           | 37         | 197         | North Carolina | Yadkin County    |
| S10          | 28         | 1           | Mississippi    | Adams County     |
| S10          | 28         | 3           | Mississippi    | Alcorn County    |
| S10          | 28         | 5           | Mississippi    | Amite County     |
| S10          | 28         | 7           | Mississippi    | Attala County    |
| S10          | 28         | 9           | Mississippi    | Benton County    |
| S10          | 28         | 11          | Mississippi    | Bolivar County   |
| S10          | 28         | 13          | Mississippi    | Calhoun County   |
| S10          | 28         | 15          | Mississippi    | Carroll County   |
| S10          | 28         | 17          | Mississippi    | Chickasaw County |
| S10          | 28         | 19          | Mississippi    | Choctaw County   |
| S10          | 28         | 21          | Mississippi    | Claiborne County |
| S10          | 28         | 23          | Mississippi    | Clarke County    |
| S10          | 28         | 25          | Mississippi    | Clay County      |
| S10          | 28         | 27          | Mississippi    | Coahoma County   |
| S10          | 28         | 29          | Mississippi    | Copiah County    |
| S10          | 28         | 31          | Mississippi    | Covington County |
| S10          | 28         | 33          | Mississippi    | De Soto County   |
| S10          | 28         | 35          | Mississippi    | Forrest County   |
| S10          | 28         | 37          | Mississippi    | Franklin County  |
| S10          | 28         | 39          | Mississippi    | George County    |
| S10          | 28         | 41          | Mississippi    | Greene County    |
| S10          | 28         | 43          | Mississippi    | Grenada County   |
| S10          | 28         | 45          | Mississippi    | Hancock County   |
| S10          | 28         | 47          | Mississippi    | Harrison County  |
| S10          | 28         | 49          | Mississippi    | Hinds County     |
| S10          | 28         | 51          | Mississippi    | Holmes County    |
| S10          | 28         | 53          | Mississippi    | Humphreys County |
| S10          | 28         | 55          | Mississippi    | Issaquena County |
| S10          | 28         | 57          | Mississippi    | Itawamba County  |
| S10          | 28         | 59          | Mississippi    | Jackson County   |

| Model Region | FIPS State | FIPS County | State       | County                 |
|--------------|------------|-------------|-------------|------------------------|
| S10          | 28         | 61          | Mississippi | Jasper County          |
| S10          | 28         | 63          | Mississippi | Jefferson County       |
| S10          | 28         | 65          | Mississippi | Jefferson Davis County |
| S10          | 28         | 67          | Mississippi | Jones County           |
| S10          | 28         | 69          | Mississippi | Kemper County          |
| S10          | 28         | 71          | Mississippi | Lafayette County       |
| S10          | 28         | 73          | Mississippi | Lamar County           |
| S10          | 28         | 75          | Mississippi | Lauderdale County      |
| S10          | 28         | 77          | Mississippi | Lawrence County        |
| S10          | 28         | 79          | Mississippi | Leake County           |
| S10          | 28         | 81          | Mississippi | Lee County             |
| S10          | 28         | 83          | Mississippi | Leflore County         |
| S10          | 28         | 85          | Mississippi | Lincoln County         |
| S10          | 28         | 87          | Mississippi | Lowndes County         |
| S10          | 28         | 89          | Mississippi | Madison County         |
| S10          | 28         | 91          | Mississippi | Marion County          |
| S10          | 28         | 93          | Mississippi | Marshall County        |
| S10          | 28         | 95          | Mississippi | Monroe County          |
| S10          | 28         | 97          | Mississippi | Montgomery County      |
| S10          | 28         | 99          | Mississippi | Neshoba County         |
| S10          | 28         | 101         | Mississippi | Newton County          |
| S10          | 28         | 103         | Mississippi | Noxubee County         |
| S10          | 28         | 105         | Mississippi | Oktibbeha County       |
| S10          | 28         | 107         | Mississippi | Panola County          |
| S10          | 28         | 109         | Mississippi | Pearl River County     |
| S10          | 28         | 111         | Mississippi | Perry County           |
| S10          | 28         | 113         | Mississippi | Pike County            |
| S10          | 28         | 115         | Mississippi | Pontotoc County        |
| S10          | 28         | 117         | Mississippi | Prentiss County        |
| S10          | 28         | 119         | Mississippi | Quitman County         |
| S10          | 28         | 121         | Mississippi | Rankin County          |
| S10          | 28         | 123         | Mississippi | Scott County           |
| S10          | 28         | 125         | Mississippi | Sharkey County         |
| S10          | 28         | 127         | Mississippi | Simpson County         |
| S10          | 28         | 129         | Mississippi | Smith County           |



Table A-1 (continued)

| Model Region | FIPS State | FIPS County | State       | County              |
|--------------|------------|-------------|-------------|---------------------|
| S10          | 28         | 131         | Mississippi | Stone County        |
| S10          | 28         | 133         | Mississippi | Sunflower County    |
| S10          | 28         | 135         | Mississippi | Tallahatchie County |
| S10          | 28         | 137         | Mississippi | Tate County         |
| S10          | 28         | 139         | Mississippi | Tippah County       |
| S10          | 28         | 141         | Mississippi | Tishomingo County   |
| S10          | 28         | 143         | Mississippi | Tunica County       |
| S10          | 28         | 145         | Mississippi | Union County        |
| S10          | 28         | 147         | Mississippi | Walthall County     |
| S10          | 28         | 149         | Mississippi | Warren County       |
| S10          | 28         | 151         | Mississippi | Washington County   |
| S10          | 28         | 153         | Mississippi | Wayne County        |
| S10          | 28         | 155         | Mississippi | Webster County      |
| S10          | 28         | 157         | Mississippi | Wilkinson County    |
| S10          | 28         | 159         | Mississippi | Winston County      |
| S10          | 28         | 161         | Mississippi | Yalobusha County    |
| S10          | 28         | 163         | Mississippi | Yazoo County        |
| S11          | 1          | 1           | Alabama     | Autauga County      |
| S11          | 1          | 3           | Alabama     | Baldwin County      |
| S11          | 1          | 5           | Alabama     | Barbour County      |
| S11          | 1          | 7           | Alabama     | Bibb County         |
| S11          | 1          | 9           | Alabama     | Blount County       |
| S11          | 1          | 11          | Alabama     | Bullock County      |
| S11          | 1          | 13          | Alabama     | Butler County       |
| S11          | 1          | 15          | Alabama     | Calhoun County      |
| S11          | 1          | 17          | Alabama     | Chambers County     |
| S11          | 1          | 19          | Alabama     | Cherokee County     |
| S11          | 1          | 21          | Alabama     | Chilton County      |
| S11          | 1          | 23          | Alabama     | Choctaw County      |
| S11          | 1          | 25          | Alabama     | Clarke County       |
| S11          | 1          | 27          | Alabama     | Clay County         |
| S11          | 1          | 29          | Alabama     | Cleburne County     |
| S11          | 1          | 31          | Alabama     | Coffee County       |
| S11          | 1          | 33          | Alabama     | Colbert County      |
| S11          | 1          | 35          | Alabama     | Conecuh County      |

| Model Region | FIPS State | FIPS County | State   | County            |
|--------------|------------|-------------|---------|-------------------|
| S11          | 1          | 37          | Alabama | Coosa County      |
| S11          | 1          | 39          | Alabama | Covington County  |
| S11          | 1          | 41          | Alabama | Crenshaw County   |
| S11          | 1          | 43          | Alabama | Cullman County    |
| S11          | 1          | 45          | Alabama | Dale County       |
| S11          | 1          | 47          | Alabama | Dallas County     |
| S11          | 1          | 49          | Alabama | De Kalb County    |
| S11          | 1          | 51          | Alabama | Elmore County     |
| S11          | 1          | 53          | Alabama | Escambia County   |
| S11          | 1          | 55          | Alabama | Etowah County     |
| S11          | 1          | 57          | Alabama | Fayette County    |
| S11          | 1          | 59          | Alabama | Franklin County   |
| S11          | 1          | 61          | Alabama | Geneva County     |
| S11          | 1          | 63          | Alabama | Greene County     |
| S11          | 1          | 65          | Alabama | Hale County       |
| S11          | 1          | 67          | Alabama | Henry County      |
| S11          | 1          | 69          | Alabama | Houston County    |
| S11          | 1          | 71          | Alabama | Jackson County    |
| S11          | 1          | 73          | Alabama | Jefferson County  |
| S11          | 1          | 75          | Alabama | Lamar County      |
| S11          | 1          | 77          | Alabama | Lauderdale County |
| S11          | 1          | 79          | Alabama | Lawrence County   |
| S11          | 1          | 81          | Alabama | Lee County        |
| S11          | 1          | 83          | Alabama | Limestone County  |
| S11          | 1          | 85          | Alabama | Lowndes County    |
| S11          | 1          | 87          | Alabama | Macon County      |
| S11          | 1          | 89          | Alabama | Madison County    |
| S11          | 1          | 91          | Alabama | Marengo County    |
| S11          | 1          | 93          | Alabama | Marion County     |
| S11          | 1          | 95          | Alabama | Marshall County   |
| S11          | 1          | 97          | Alabama | Mobile County     |
| S11          | 1          | 99          | Alabama | Monroe County     |
| S11          | 1          | 101         | Alabama | Montgomery County |
| S11          | 1          | 103         | Alabama | Morgan County     |
| S11          | 1          | 105         | Alabama | Perry County      |

**Table A-1 (continued)**[illegible][illegible]